Air Quality Monitoring

Edson and Hinton Area

Alberta Environment

September 1999 to June 2000 — Final Report

Summary

Alberta Environment conducted a mobile, ambient air quality monitoring survey in the Edson and Hinton areas of Alberta. The study consisted of four weeklong surveys, over four seasons, for one year. The objectives of monitoring this area were: (1) to determine concentrations of air pollutants representative of the monitored locations in the survey area; (2) to compare air pollutant levels to data from other locations in Alberta; and (3) to compare air pollutant levels to Alberta's air quality guidelines.

Alberta Environment conducts mobile air quality surveys each year as part of its air quality monitoring program. These monitoring surveys are unannounced and use the department's *Mobile Air Monitoring Laboratory* (MAML). Pollutants measured by the MAML included carbon monoxide, oxides of nitrogen, ozone, particulates, hydrocarbons, sulphur dioxide, hydrogen sulphide, total reduced sulphur and ammonia.

During this survey, the mobile lab monitored air quality for twenty days at eighteen sites in Edson and Hinton and downwind of industrial facilities in the Edson area. Each location was monitored for a minimum of one hour to allow comparison to the air quality guidelines. The survey obtained about 152 hours of air quality monitoring information. Sites were selected to provide data near populated areas and near industrial sites. This report represents the results of the fall (September 13 to 16, 1999), winter (February 7 to 9, 17 and 18, 2000), spring (April 18, 19, 25 to 27, 2000) and summer (June 4, 5, 13 to 16, 2000) surveys.

Findings

(1) Concentrations of most air pollutants measured in the Edson and Hinton area survey were below Alberta's Ambient Air Quality Guidelines. Alberta has one-hour air quality guidelines for hydrogen sulphide, sulphur dioxide, ozone, nitrogen dioxide, carbon monoxide and ammonia. Maximum one-hour concentrations were:

- 2.4 times the one-hour guideline for hydrogen sulphide;
- 1% of the one-hour guideline for ammonia;
- 6% of the one-hour guideline for carbon monoxide;
- 13% of the one-hour guideline for nitrogen dioxide;

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- 67% of the one-hour guideline for ozone; and
- 14% of the one-hour guideline for sulphur dioxide.

(2) The one-hour guideline for hydrogen sulphide was exceeded once during the monitoring survey at Site #5 in the Wolf Lake Road area southeast of Edson. The maximum one-hour concentration recorded for this chemical was 0.024 ppm (parts per million), and was monitored between 11:39 a.m. and 12:39 p.m. on September 13, 1999. This level was detected just outside the CCS facility gate and was likely caused by fugitive emissions from this facility. The one-hour guideline for hydrogen sulphide is 0.010 ppm.

(3) The maximum one-hour concentration for sulphur dioxide was 0.023 ppm, and was detected at Site #9 (2 km south of Bickerdike road corner on Hwy 47) on the afternoon of February 9, 2000. This maximum value is low compared to the one-hour guideline for sulphur dioxide of 0.172 ppm.

(4) Hydrogen sulphide and sulphur dioxide levels were very low during the survey in the Towns of Edson and Hinton. The maximum one-hour concentrations measured in these communities were 0.007 and 0.021 ppm, respectively, for hydrogen sulphide and sulphur dioxide. The one-hour guideline is 0.010 ppm for hydrogen sulphide and 0.172 ppm for sulphur dioxide.

(5) The maximum one-hour total suspended particulate concentration measured was 515 $\mu g/m^3$ (micrograms per cubic metre of air). This level was detected at Site #14 (Church on Mountain Street near Reimer Drive in Hinton) on April 19. Levels of PM_{10} (inhalable particulates) were 318 $\mu g/m^3$, and levels of $PM_{2.5}$ (respirable particulates) were 34 $\mu g/m^3$, at this location during this time. These particulate levels were likely associated with local industrial activities. Alberta does not have a one-hour guideline for particulate concentrations, although the 24-hour guideline for total suspended particulates is 100 $\mu g/m^3$ and the 24-hour Canada-wide Standard benchmark concentration for $PM_{2.5}$ is 30 $\mu g/m^3$.

Alberta's Ambient Air Quality Guidelines

Alberta's Ambient Air Quality Guidelines[1] are established under Section 14 of the Environmental Protection and Enhancement Act (EPEA). EPEA provides for the development of guidelines and ambient environmental quality objectives for all or part of Alberta.

The Ambient Air Quality Guidelines are used for:

- reporting on the state of the atmospheric environment in Alberta.
- reporting to Albertans on the quality of air through an air quality index.
- establishing approval conditions for regulated industrial facilities.
- evaluating proposals to construct facilities that will have air emissions.
- guiding special ambient air quality surveys.
- assessing compliance near major industrial air emission sources.

Alberta's Ambient Air Quality Guidelines for one-hour concentrations of parameters monitored by the MAML are indicated in Table 1.1.

[1] *Alberta Ambient Air Quality Guidelines*. Alberta Environment. February 2000.

Table 1.1 Alberta's Ambient Air Quality Guidelines for parameters measured by the MAML.

Air Quality Parameter	One-hour Guideline (ppm*)	Basis for Guideline
hydrogen sulphide	0.01	odour perception
sulphur dioxide	0.172	taste, odour perception and effects on bluegrass
nitrogen dioxide	0.212	odour perception
ozone	0.082	reduction of lung function and effects on tomatoes
carbon monoxide	13	oxygen carrying capacity of blood
ammonia	2	odour perception

* Parts per million by volume.

Monitoring Method

Alberta Environment used the *Mobile Air Monitoring Laboratory* (MAML) to monitor air quality in the Edson and Hinton areas. A total of 152 hours of data were collected by the MAML from September 1999 and June 2000. These data were collected in the Town of Edson (44 hours), near industries in the Edson area (32 hours) and in the Town of Hinton (76 hours). Air quality was monitored on the following dates representing the fall, winter, spring and summer seasons.

- Fall (September 13, 14, 15 and 16, 1999).
- Winter (February 7, 8, 9, 17 and 18 2000).
- Spring (April 18, 19, 25, 26 and 27, 2000).
- Summer (June 4, 5, 13, 14, 15 and 16, 2000).

The MAML monitored air quality at 18 sites: three sites in the Town of Edson, eight sites near industries in the Edson area, and seven sites in the Town of Hinton. These sites are indicated in Figures 1.2 to 1.4 and Table 1.3 (pages 5 and 6). Monitoring was conducted for a minimum of one hour at each location to allow comparison with Alberta's Ambient Air Quality Guidelines.

The initial monitoring sites were selected based on consultation with regional staff from Alberta Environment. Monitoring locations were reviewed as the survey progressed and modified based on concerns indicated through public complaints or observations by the MAML operators.

The MAML is a 27-foot (8.2 m) vehicle that has been specially designed and equipped to measure air quality. It houses a variety of instruments that continuously sample the air at specified time or distance intervals. The MAML is equipped with:

- a dual computer system custom-programmed to accept and record the measurement of air samples from each analyzer.
- a GPS (Global Positioning System) that identifies the MAML's location as it moves around Alberta.
- an exhaust purifying system that minimizes emissions from the vehicle.
- two on-board generators that are also equipped with exhaust scrubbers.

The parameters measured by the MAML during the Edson/Hinton survey are indicated in Table 1.2. Tables A1 and A2 (pages 21 and 22) contain median and maximum air pollutant levels at all sites during the survey. Typical median and maximum pollutant concentrations at other locations in Alberta are shown in Tables A3 and A4 (pages 23 and 24). Air pollutant concentrations, weather conditions and the MAML operator's comments for each location monitored are indicated in Tables A5 to A16 (pages 25 to 36).

Figure1.1 Alberta Environment's Mobile Air Monitoring Laboratory (MAML).

Table 1.2 Parameters monitored by the MAML in the Edson/Hinton survey (also includes minimum detection limits and operating ranges).

Parameter Measured	Minimum Detectable Limit*	Operating Range**
sulphur dioxide (SO_2)	0.6 ppb	1 ppm
hydrogen sulphide (H_2S)	0.6 ppb	1 ppm
total reduced sulphur (TRS)	0.6 ppb	1 ppm
total hydrocarbons (THC)	0.005 ppm	20 ppm
reactive hydrocarbons (RHC)	0.005 ppm	20 ppm
methane (CH_4)	0.005 ppm	10 ppm
polycyclic aromatic hydrocarbons (PAHs)	3 ng/m^3	1000 ng/m^3
ozone (O_3)	0.001 ppm	0.5 ppm
nitrogen dioxide (NO_2)	1.0 ppb	1 ppm
nitric oxide (NO)	1.0 ppb	1 ppm
total oxides of nitrogen (NO_x)	1.0 ppb	1 ppm
total suspended particulates (TSP)	1 $\mu g/m^3$	1.0 g/m^3
inhalable particulates (PM_{10})	1 $\mu g/m^3$	1.0 g/m^3
respirable particulates ($PM_{2.5}$)	1 $\mu g/m^3$	1.0 g/m^3
carbon monoxide (CO)	0.1 ppm	50 ppm
ammonia (NH_3)	1.0 ppb	5 ppm
wind direction (WDR)	0 degrees	360 degrees
wind speed (WSP)	0 kph	200 kph
temperature (Temp)	-40 °C	50 °C
relative humidity (RH)	0 %	100 %

ppb = parts per billion; ppm = parts per million; ng/m^3 = nanograms per cubic metre
$\mu g/m^3$ = micrograms per cubic metre; g/m^3 = grams per cubic metre; kph = kilometres per hour
°C = degrees Celsius; % = per cent

* The ***minimum detectable limit*** indicates the *minimum* amount of pollutant the instrument can measure.

** The ***operating range*** indicates the *maximum* amount of pollutant the instrument can detect. This limit is set to provide the optimum precision over that range. The upper limit can be raised, however, precision at the lower levels (where most levels are monitored) is then compromised.

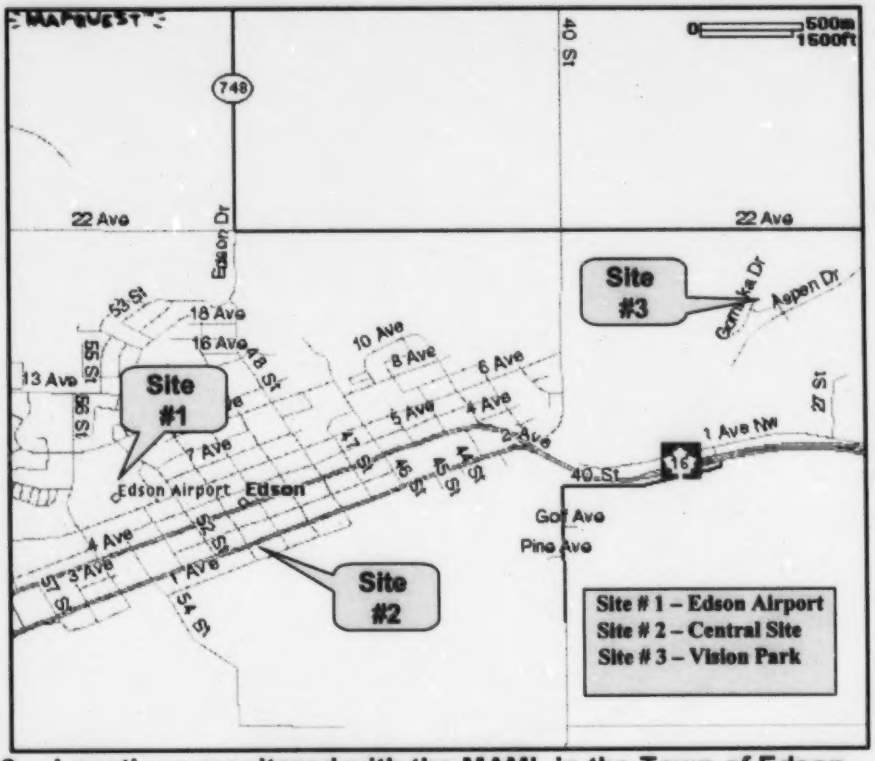

Figure 1.2 Locations monitored with the MAML in the Town of Edson.

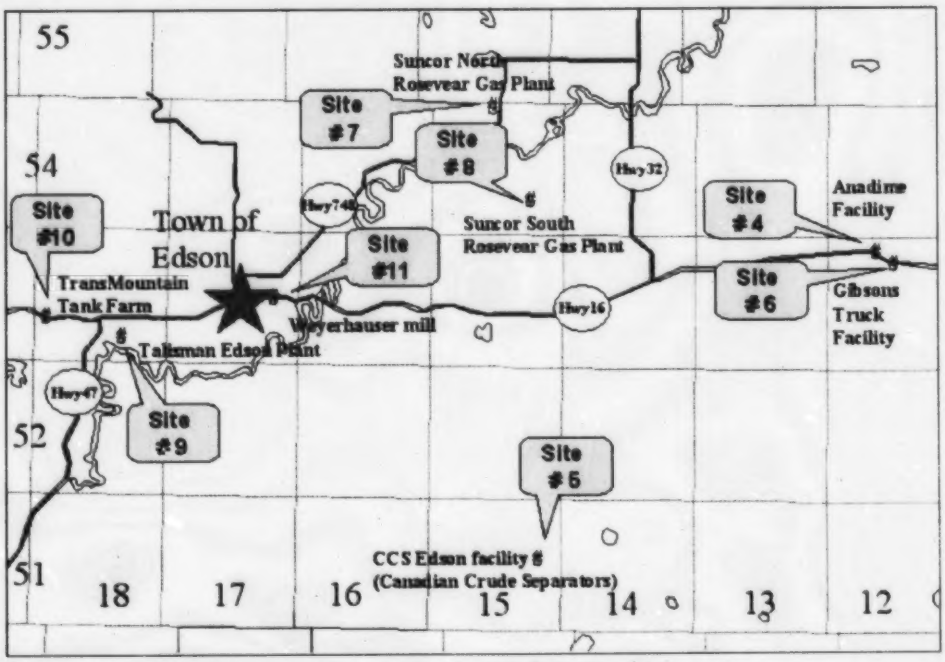

Figure 1.3 Locations monitored with the MAML in the Edson area.

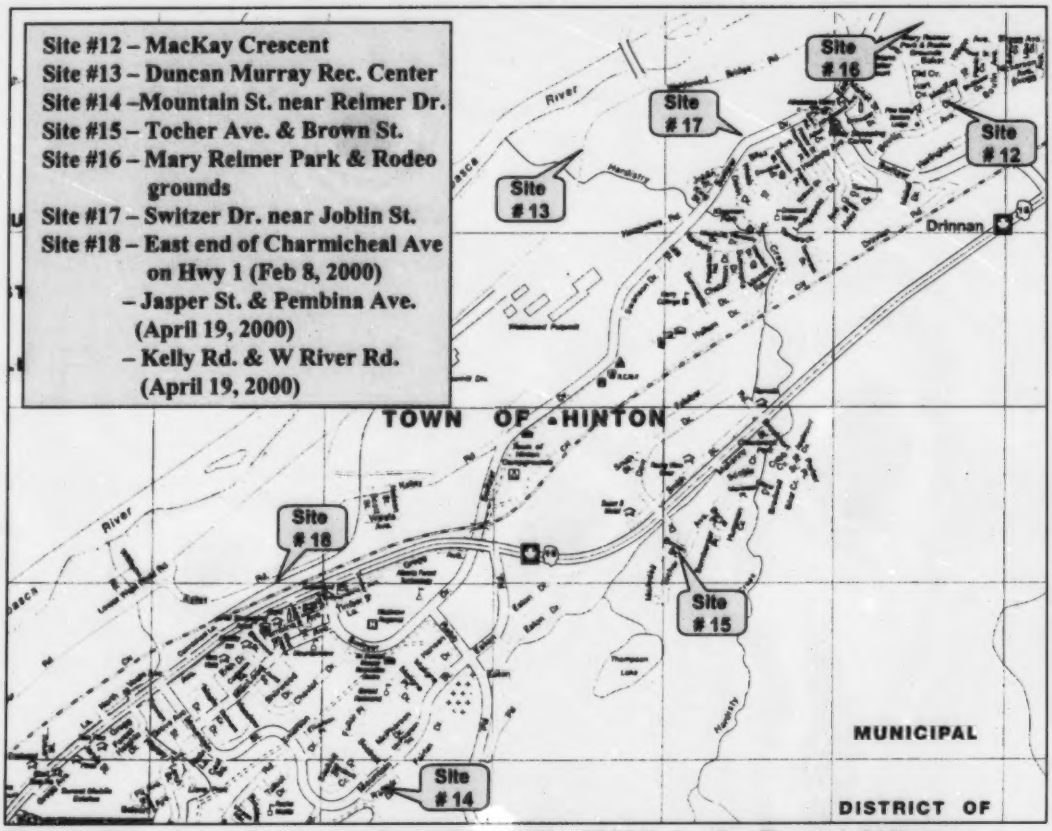
Site #12 – MacKay Crescent
Site #13 – Duncan Murray Rec. Center
Site #14 –Mountain St. near Reimer Dr.
Site #15 – Tocher Ave. & Brown St.
Site #16 – Mary Reimer Park & Rodeo grounds
Site #17 – Switzer Dr. near Joblin St.
Site #18 – East end of Charmicheal Ave on Hwy 1 (Feb 8, 2000)
– Jasper St. & Pembina Ave. (April 19, 2000)
– Kelly Rd. & W River Rd. (April 19, 2000)
Site # 16
Site # 17
Site # 12
Site # 13
Drinnan
TOWN OF HINTON
Site # 18
Site # 15
Site # 14
MUNICIPAL
DISTRICT OF

Figure 1.4 Locations monitored with the MAML in the Town of Hinton.

Location of Sites monitored in the Edson/ Hinton Areas							
Area	Site #	Monitoring Location		Dates Monitored			
				Sept, 1999	Feb, 2000	April, 2000	June, 2000
Town of Edson	Site #1	Edson Airport	N 1/2 17-53-17-W5M	14	9, 17	25, 26, 27	5
	Site #2	Central Site	44th st & 5th ave		9		4, 5, 13, 14
	Site #3	Vision Park	31st st & 8th ave	14		25, 26, 27	5, 13, 14
Edson Area	Site #4	Anadime facility	6-33-53-12 W5M				13
	Site #5	CCS (Canadian Crude Separators) Edson Facility	5-24-51-15 W5M	13, 14			
	Site #6	Gibsons Truck Facility	13-27-53-12 W5	14			
	Site #7	Suncor North Rosevear Facility	16-33-54-15 W5M		17, 18	25, 26	13, 14
	Site #8	Suncor South Rosevear Facility	10-11-54-15 W5M		18	26, 27	13, 14
	Site #9	Talisman Edson Facility	4-11-53-18 W5M	13, 14	9, 17, 18	26, 27	13, 14
	Site #10	TransMountain Tank Farm	SW 18-53-18 W5M			26	14
	Site #11	Weyerhauser Facility	SE 23-53-17 W5M	14	17	26	
Town of Hinton	Site #12	MacKay Crescent	Valley District-Hinton	15			15, 16
	Site #13	Duncan Murray Recreation Center		15, 16	7, 8	18, 19	15, 16
	Site #14	Church on Mountain St. near Reimer Dr.	Hill District - Hinton	15, 16	7, 8	18, 19	15, 16
	Site #15	Tocher Ave. & Brown St.		15, 16	7, 8	18, 19	14, 15, 16
	Site #16	Mary Reimer Park & Rodeo grounds	Valley Dist. - Hinton	15, 16	7, 8	18, 19	16
	Site #17	Switzer Dr. near Joblin St.		16	7, 8	18	15, 16
	Site #18	East end of Charmicheal Ave on Hwy 1	West Hinton		8		
		Jasper St. & Pembina Ave.				19	
		Kelly Rd. & W River Rd.				19	

Table 1.3 List of site numbers and associated locations monitored by the MAML.

Sulphur Dioxide (SO_2)

maximum one-hour concentration recorded during survey	one-hour guideline
0.023 ppm	0.172 ppm (based on taste, odour perception and effects on bluegrass)

Sulphur dioxide (SO_2) is a colourless gas with a pungent odour. In Alberta, it is estimated that 45 per cent of SO_2 emissions are produced by natural gas processing plants while oil sands and power plants produce about 26 per cent and 21 per cent of SO_2 emissions, respectively[2]. Other sources include gas plant flares, oil refineries, pulp and paper mills and fertilizer plants.

SO_2 levels were below Alberta's one-hour guideline at all sites monitored in the survey area. The maximum one-hour concentration of 0.023 ppm was measured at Site #9 (Talisman Edson Facility), from 2:05 p.m. to 3:12 p.m. on February 9, 2000. The MAML operator noted odours when this reading was detected. This reading was likely caused by emissions from the nearby facility. The second highest maximum one-hour SO_2 concentration (0.021 ppm) occurred at Site #2 (Edson central site), on June 4, 2000 from 8:58 a.m. to 9:57 a.m.

The next highest one-hour SO_2 concentrations were measure at Sites #16 (0.015 ppm at Mary Reimer Park and Rodeo grounds in Hinton) and Site #8 (0.012 ppm at the Suncor South Rosevear facility). SO_2 levels at the remaining monitoring sites were 0.008 ppm or lower (see Table A2 on page 22). The one-hour guideline for SO_2 is 0.172 ppm.

The maximum one-hour SO_2 concentration measured in the Edson/Hinton survey (0.023 ppm) was lower than maximum values recorded in the Caroline/Sundre (0.043 ppm), County of Grande Prairie (0.043 ppm) and Bow Corridor (0.092 ppm) MAML surveys. Maximum SO_2 concentrations at permanent monitoring stations in 2000 ranged from 0.006 ppm at the Steeper station (located southeast of Hinton) to 0.284 ppm at the Mannix station (located north of Fort McMurray). The Steeper station is operated by the West Central Airshed Society and the Mannix station is operated by the Wood Buffalo Environmental Association. Data for permanent monitoring stations in Alberta for 2000 are presented in Tables A3 and A4 on pages 23 and 24.

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[2] *Environment Canada. 1998. 1995 Criteria Air Contaminant Emissions Inventory Summaries. Pollution Data Branch, Environment Canada. http://www2.ec.gc.ca/pdb/cac/cac.html.*

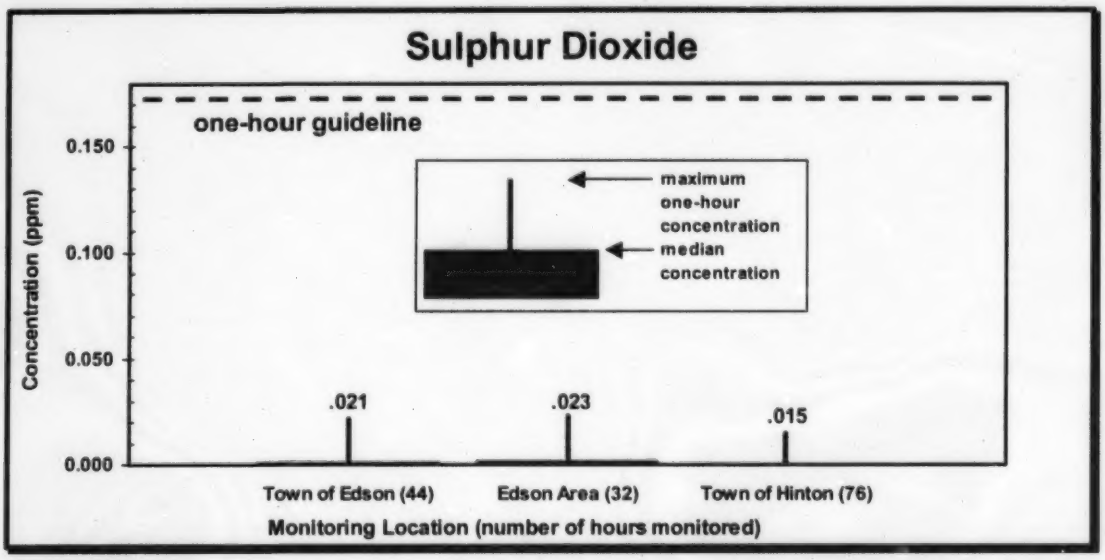

Figure 1.5 One-hour median and maximum concentrations for sulphur dioxide.

Hydrogen Sulphide and Total Reduced Sulphur (H_2S and TRS)

maximum one-hour concentration recorded during survey	one-hour guideline
H_2S = 0.024 ppm	0.010 ppm (based on odour perception)
TRS = 0.024 ppm	no guideline

Hydrogen sulphide (H_2S) is a colourless gas with a rotten egg odour. Total reduced sulphur (TRS) includes hydrogen sulphide, mercaptans, dimethyl sulphide, dimethyl disulphide and other sulphur compounds. Sulphur dioxide is not included in the determination of TRS. Industrial sources of H_2S and TRS include fugitive emissions (leakages) from petroleum refineries, tank farms for unrefined petroleum products, natural gas plants, petrochemical plants, oil sands plants, sewage treatment facilities, pulp and paper plants that use the Kraft pulping process, and animal feedlots. Natural sources of H_2S include sulphur hot springs, sloughs, swamps and lakes.

H_2S concentrations were below Alberta's one-hour air quality guideline at most locations monitored during the survey. However, the one-hour guideline of 0.010 ppm was exceeded at Site #5 (CCS Edson facility) on September 13, 1999 from 11:39 a.m. to 12:39 p.m. A concentration of 0.024 ppm for H_2S and TRS was measured during this time period. The MAML was positioned downwind just outside the facility gates and the MAML operator detected strong odours when these readings were measured. Elevated H_2S and TRS readings at Site #5 can be attributed to fugitive emissions from the nearby facility.

The next highest H_2S and TRS readings were measured at Site #17 (Switzer Drive near Joblin Street in Hinton) on September 16, 1999 from 7:49 a.m. to 9:15 a.m. The one-hour H_2S and TRS concentrations at this time were 0.007 and 0.008 ppm, respectively. The one-hour guideline for H_2S is 0.010 ppm.

The maximum H_2S concentrations measured at the other stations in Alberta (based on 2000 data) ranged from 0.005 ppm at Sherwood Park to 0.099 ppm at the Mildred Lake station (located north of Fort McMurray). The maximum H_2S concentrations measured in other MAML surveys in Alberta ranged from 0.002 ppm in the Bow Corridor survey to 0.054 ppm in the Lethbridge area survey.

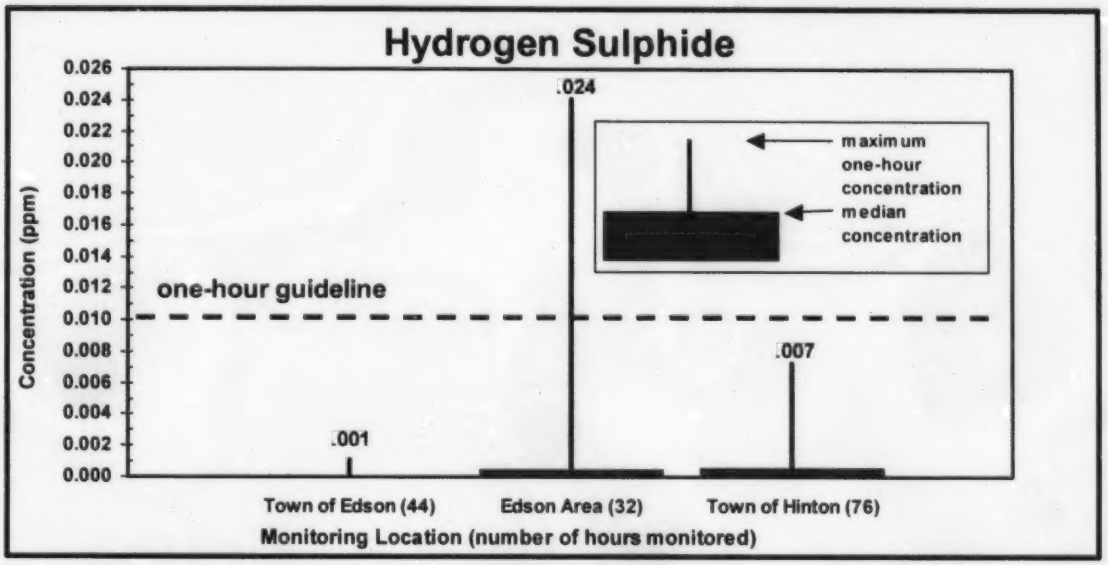

Figure 1.6 One-hour median and maximum concentrations for hydrogen sulphide.

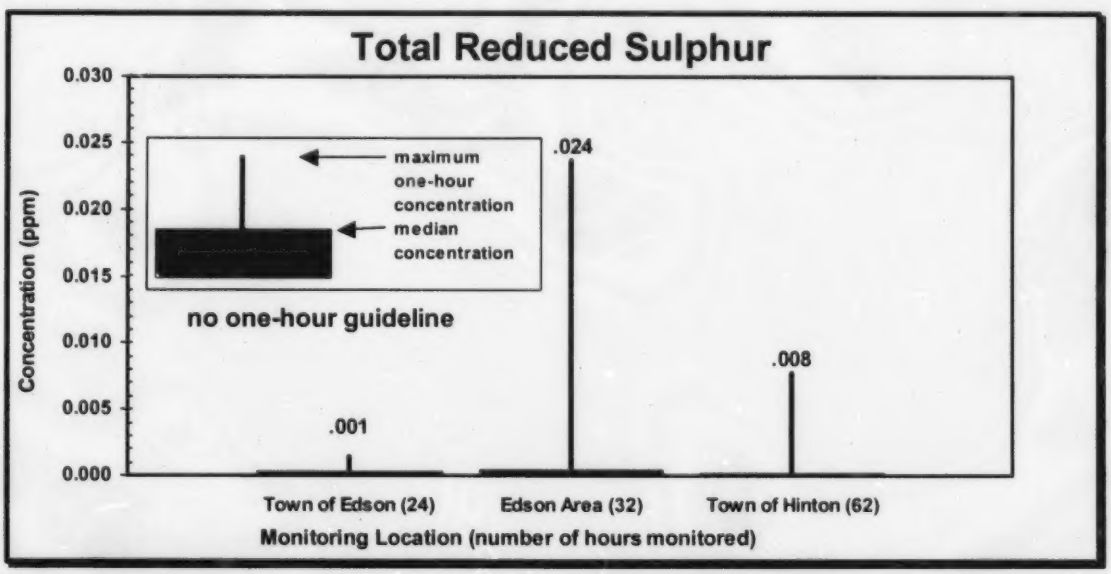

Figure 1.7 One-hour median and maximum concentrations for total reduced sulphur.

Hydrocarbons (THC, RHC and CH_4)

maximum one-hour concentration recorded during survey	one-hour guideline
THC = 3.0 ppm	no guideline
RHC = 0.6 ppm	no guideline
CH_4 = 2.4 ppm	no guideline

The term "total hydrocarbons" (THC) refers to a broad family of chemicals that contain carbon and hydrogen atoms. Methane (CH_4), a non-reactive hydrocarbon, is the most common hydrocarbon in the earth's atmosphere. Specific reactive hydrocarbons (RHC) are important because they can react with oxides of nitrogen in the presence of sunlight to form ozone, and they can be toxic (at high concentrations) to humans, animals or vegetation. Sources of hydrocarbons include vegetation, vehicle emissions, gasoline marketing and storage tanks, petroleum and chemical industries, dry cleaning, fireplaces, natural gas combustion and aircraft traffic. Hydrocarbons are also emitted by fugitive sources such as evaporation of solvents, or leaking valves, flanges, pumps and compressors at industrial facilities. Incinerator and flare stacks can also be sources of hydrocarbons. Many hydrocarbons, such as CH_4, are emitted by natural sources. Normal background THC concentrations recorded in rural Alberta range from 1.5 to 2.0 ppm. Background hydrocarbons are primarily composed of CH_4 with a small contribution from RHC (about 0.2 ppm).

Hydrocarbon levels were generally low during the Edson/Hinton survey. The highest hydrocarbon concentrations were measured at Site #9 (Talisman Edson facility) on September 14, 1999 from 6:51 p.m. to 7:52 p.m. with a maximum one-hour THC concentration of 3.0 ppm. Maximum THC concentrations at other locations in the province ranged from 2.2 ppm in the City of Lethbridge MAML survey to 32.4 ppm in the County of Grande Prairie survey.

The overall median THC, RHC and CH_4 concentrations at the 18 sites in the survey area were 1.9, 0.1, and 1.8 ppm, respectively. These values are in the range of the normal background levels for hydrocarbons found in rural Alberta.

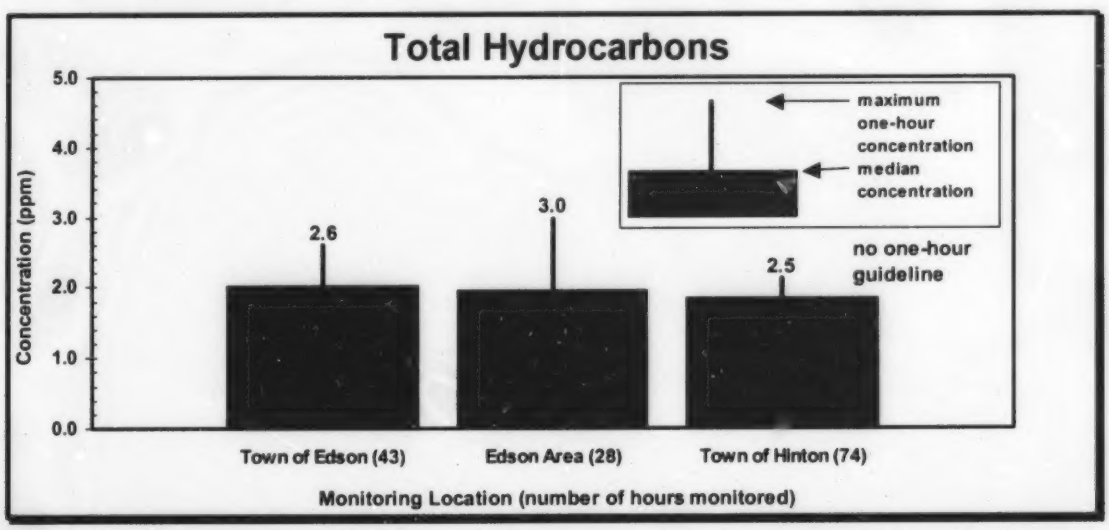

Figure 1.8 One-hour median and maximum concentrations for total hydrocarbons.

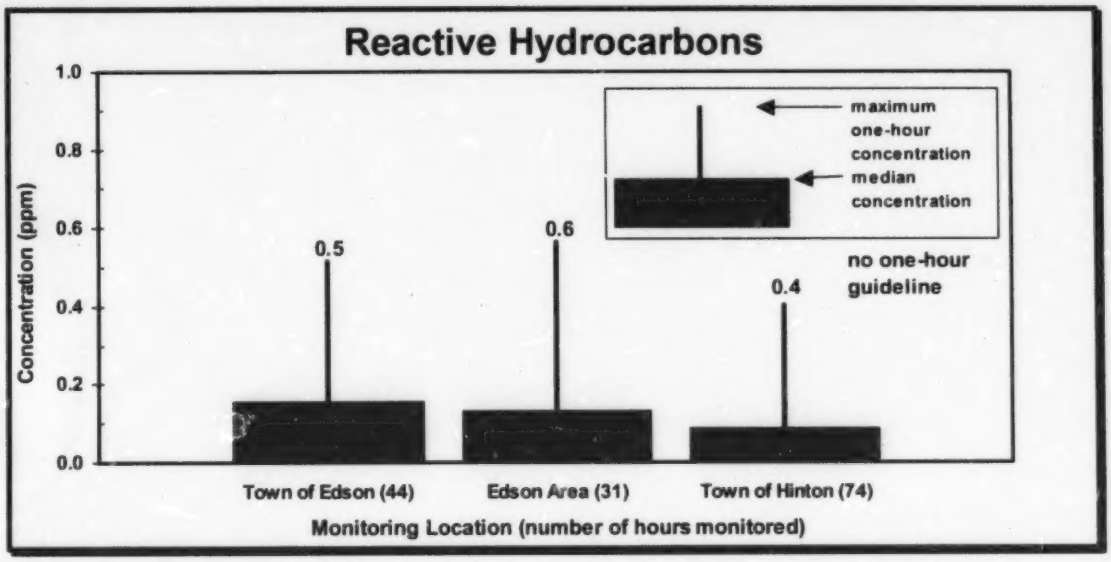

Figure 1.9 One-hour median and maximum concentrations for reactive hydrocarbons.

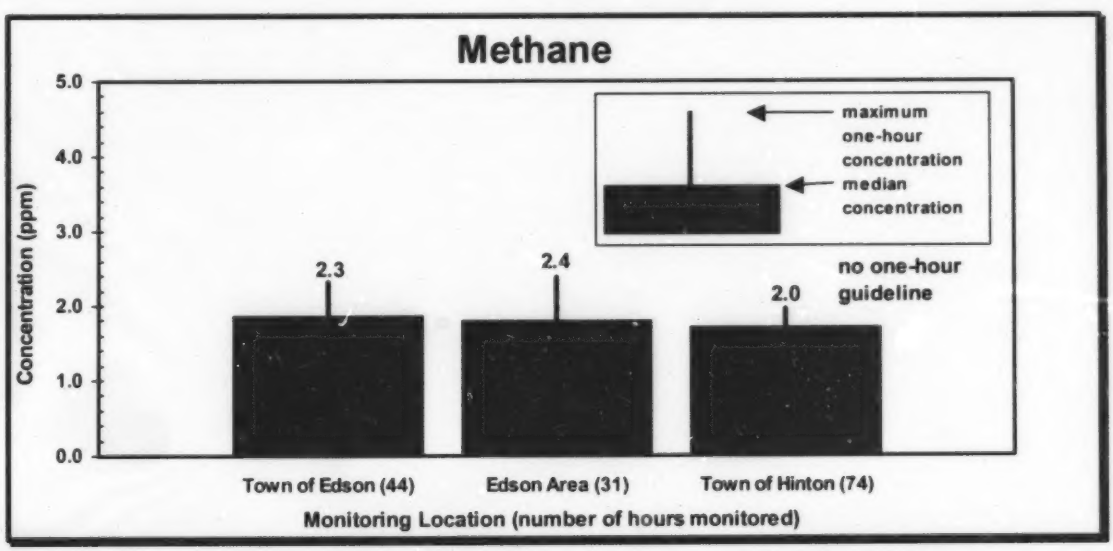

Figure 1.10 One-hour median and maximum concentrations for methane.

Particulates (TSP, PM_{10} and $PM_{2.5}$)

maximum one-hour concentration recorded during survey	one-hour guideline
TSP = 515 µg/m^3	no guideline
PM_{10} = 322 µg/m^3	no guideline
$PM_{2.5}$ = 34 µg/m^3	no guideline

Air pollutants are not necessarily in a gaseous form. Tiny particles of solid material or liquid droplets, defined collectively as particulates, are also present in the atmosphere. Total suspended particulates (TSP) refer to all particles up to 500 microns in diameter (a human hair is about 70 microns in diameter) and are important primarily from a nuisance perspective. Particles less than 10 micrometres in diameter (PM_{10}) can be inhaled into the nose and throat while smaller particles, less than 2.5 micrometres in diameter ($PM_{2.5}$), can penetrate into the lungs.
Sources of particulates include soil dust, road dust, agricultural dust (e.g., harvest), smoke from forest fires and recreational wood burning, vehicle exhaust emissions, brake and tire wear, and industrial emissions. Smaller particles ($PM_{2.5}$) originate in the atmosphere because of condensation and combustion from sources such as vehicle exhaust emissions, industrial emissions and wood burning. $PM_{2.5}$ are also formed as a result of reactions of gaseous chemicals in the air.

High particulate concentrations were recorded at several sites during this survey. The major source of particulates at monitoring locations in the Edson/Hinton area was road dust from traffic travelling on roads adjacent to the monitoring locations. However, industrial sources in Hinton were also sources of particulates measured during this survey.

The highest particulate concentrations were measured at Site #14 (Church on Mountain Street near Reimer Drive in Hinton) on April 19, 2000 and at Site #1 (Edson Airport) on April 25, 2000. Maximum one-hour TSP, PM_{10} and $PM_{2.5}$ levels at Site #14 were 515, 318 and 34 µg/m^3, respectively. Maximum one-hour TSP, PM_{10} and $PM_{2.5}$ levels at Site #1 were 488, 322, and 29 µg/m^3. Elevated particulate levels were also measured at Sites #13 (Duncan Murray Recreation Centre in Hinton), Site #2 (Edson central site) and Site #18 (Jasper Street and Pembina Avenue in Hinton).

Maximum one-hour average TSP, PM_{10} and $PM_{2.5}$ levels at other mobile surveys in Alberta ranged from 52, 43, and 17 µg/m^3, respectively, in the Caroline/Sundre area survey to 2305, 1287, and 101 µg/m^3, respectively, in the County of Grande Prairie survey.

The median TSP value for the entire Edson/Hinton area survey was 49 µg/m^3. Median TSP levels recorded during other mobile monitoring surveys in Alberta ranged from 4 µg/m^3 in the Caroline/Sundre area to 74 µg/m^3 in the Bow Corridor survey. The median PM_{10} and $PM_{2.5}$ concentrations for the Edson/Hinton area survey were 29 and 4 µg/m^3, respectively. Median PM_{10} levels were between 3 and 40 µg/m^3 in other mobile surveys in Alberta. Median $PM_{2.5}$ levels are typically 2 µg/m^3 or less at rural locations in Alberta and close to 10 µg/m^3 in Edmonton and Calgary.

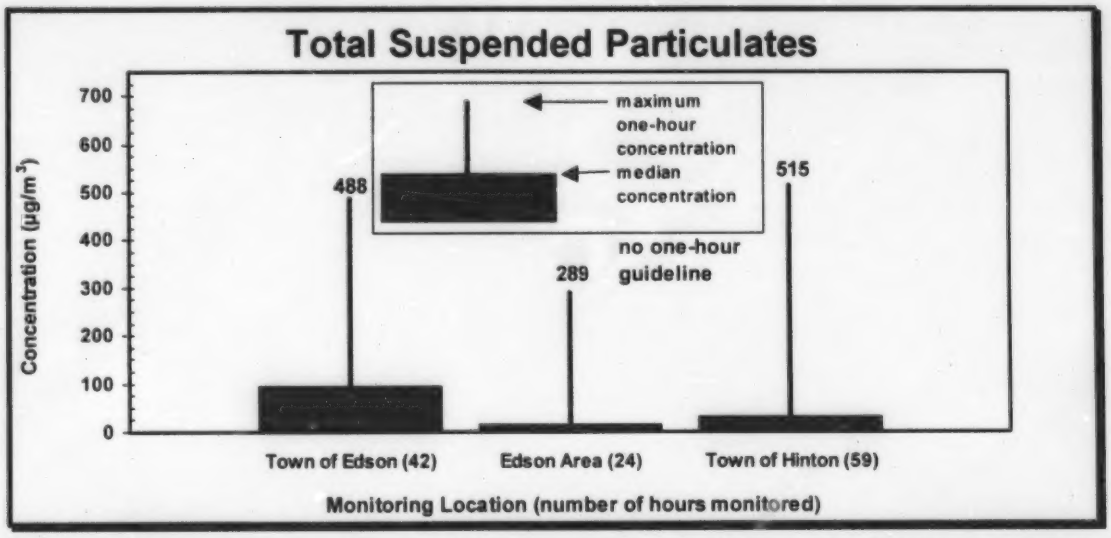

Figure 1.11 One-hour median and maximum concentrations for total suspended particulates.

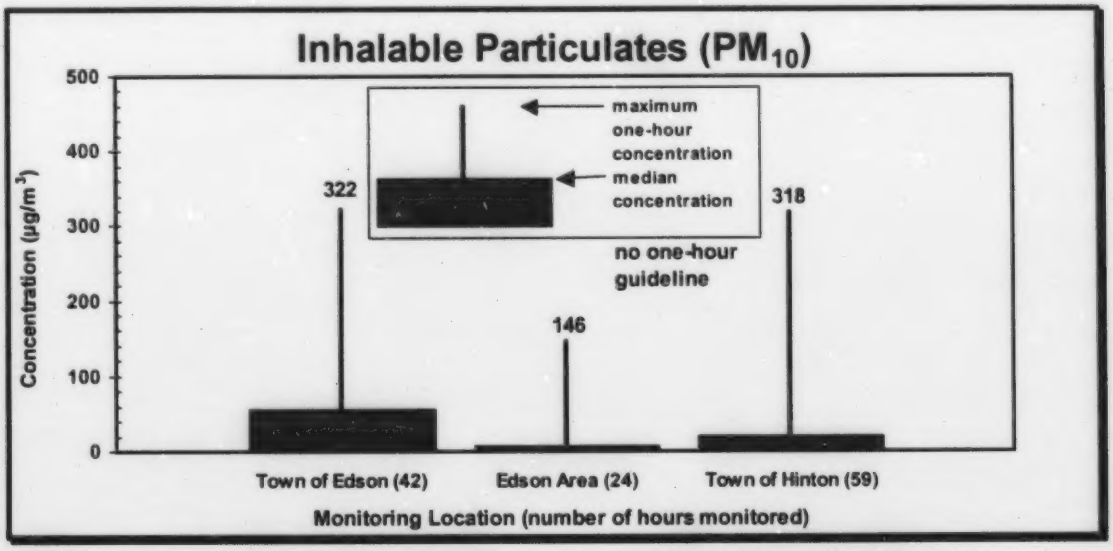

Figure 1.12 One-hour median and maximum concentrations for inhalable particulates (PM_{10}).

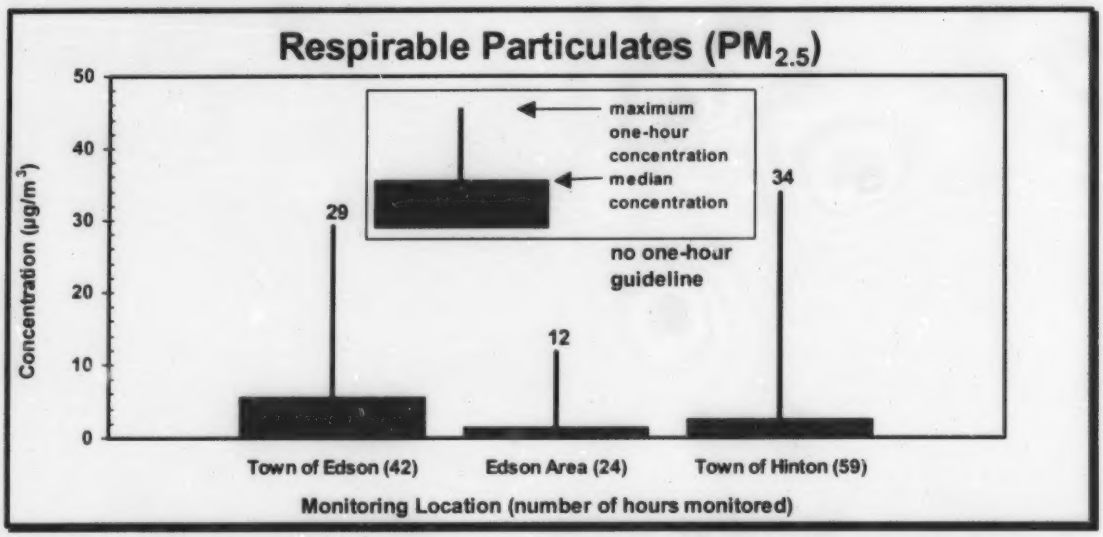

Figure 1.13 One-hour median and maximum concentrations for respirable particulates ($PM_{2.5}$).

Ozone (O_3)

maximum one-hour concentration recorded during survey	one-hour guideline
0.055 ppm	0.082 ppm (based on reduction of lung function and effects on tomatoes)

Ozone in the lower atmosphere is produced by the reaction of oxides of nitrogen and volatile organic compounds in the presence of sunlight, and transport from the "ozone rich" upper atmosphere to ground level. Transport from the upper atmosphere is likely the dominant ozone producing process in the fall, winter and early spring seasons. O_3 concentrations are generally lower in urban centres due to the destruction of O_3 by nitric oxide.

The typical daily and seasonal variations of O_3 concentrations that are observed at other locations in Alberta were also noted in the Edson/Hinton area survey. The highest O_3 concentrations were generally measured in the afternoon of the spring and summer seasons. The maximum one-hour average O_3 concentration (0.055 ppm) was recorded over a two-hour period from 11:03 a.m. to 1:02 p.m. on June 5 at Site #2 (Edson central site). Warm, sunny conditions were prevalent when this ozone concentration was detected. This maximum value is 67 per cent of the one-hour guideline for O_3.

The median O_3 concentration in the Edson/Hinton area survey ranged from 0.018 ppm at Site #4 (Anadime facility) to 0.043 ppm at Site #8 (Suncor South Rosevear facility). Lower median O_3 concentrations were observed at sites that were monitored more frequently in the morning and higher median levels were measured at sites that were monitored in the afternoon. Higher O_3 levels are observed in the afternoon because of more sunlight, warmer temperatures and more vertical mixing of the atmosphere. All of these factors lead to higher background ground-level O_3 levels.

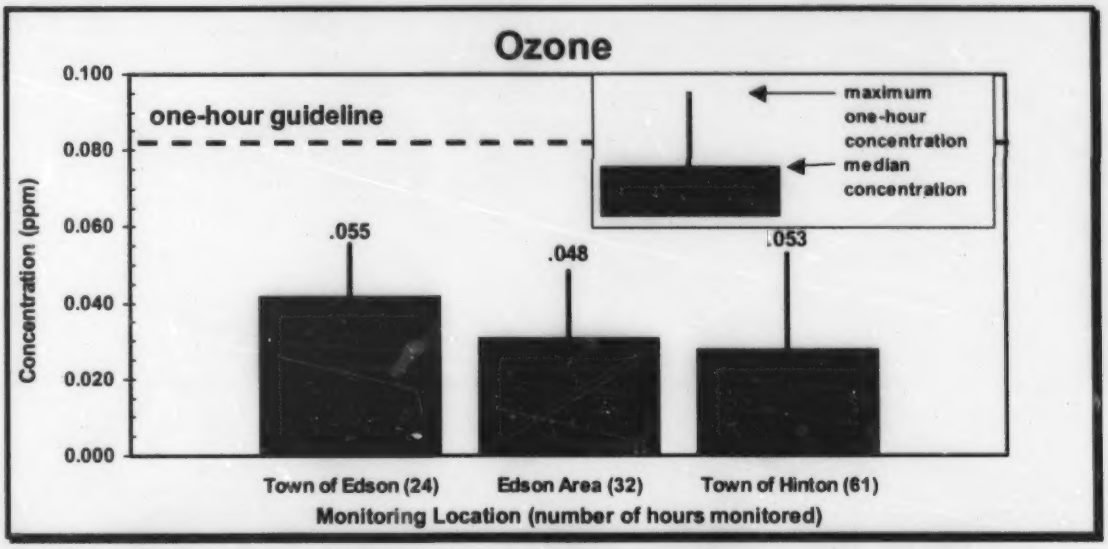

Figure 1.14 One-hour median and maximum concentrations for ozone.

The median O_3 concentration for the entire Edson/Hinton area survey was 0.031 ppm. Typical median O_3 levels at rural locations in Alberta range from about 0.012 to 0.045 ppm based on 2000 data. Ozone levels in large cities are generally much lower than rural areas because of destruction of natural O_3 by nitric oxide emitted by vehicles.

Oxides of Nitrogen (NO_2, NO and NO_x)

maximum one-hour concentration recorded during survey	one-hour guideline
NO_2 = 0.027 ppm	0.212 ppm (based on odour perception)
NO = 0.055 ppm	no guideline
NO_x = 0.065 ppm	no guideline

Oxides of nitrogen (NO_x) are the total of nitrogen dioxide (NO_2) and nitric oxide (NO). During high temperature combustion - as in the burning of natural gas, coal, oil and gasoline - atmospheric nitrogen may combine with molecular oxygen to form NO. NO is colourless and odourless. Most NO in the ambient air is oxidized to form NO_2. NO_2 is a reddish-brown gas with a pungent odour. The major source of oxides of nitrogen in urban areas is vehicle exhaust emissions. Processes associated with the oil and gas industry also emit oxides of nitrogen into the atmosphere.

NO_2 levels were below Alberta's one-hour guideline of 0.212 ppm at all monitoring locations during the Edson/Hinton area survey. The maximum NO_2 concentration was recorded at Site #2 (Edson central site) on June 4, 2000 from 9:31 p.m. to 10:30 p.m. (0.027 ppm). The next highest NO_2 concentrations were measured in Hinton at Sites #15 (Tocher Avenue and Brown Street), #13 (Duncan Murray Recreation Centre) and #14 (Church on Mountain Street near Reimer Drive). Maximum NO_2 values were 0.026, 0.025 and 0.024 ppm at these sites, respectively. Maximum NO_2 levels at the remaining monitoring sites were from 0.002 and 0.017 ppm. The primary source of oxides of nitrogen in Edson and Hinton is emissions from local traffic.

Maximum one-hour NO_2 concentrations during other MAML surveys conducted by Alberta Environment ranged from 0.013 to 0.080 ppm. Based on data collected in 2000, maximum one-hour NO_2 concentrations in Edmonton and Calgary ranged from 0.029 to 0.101 ppm due to the influence of vehicle exhaust emissions.

The overall median NO_2 concentration at all sites in the Edson/Hinton area survey was 0.004 ppm. Median NO_2 levels at rural locations in Alberta generally range from 0.001 to 0.004 ppm (based on 2000 data). In Edmonton and Calgary, typical median NO_2 levels range from 0.014 to 0.027 ppm.

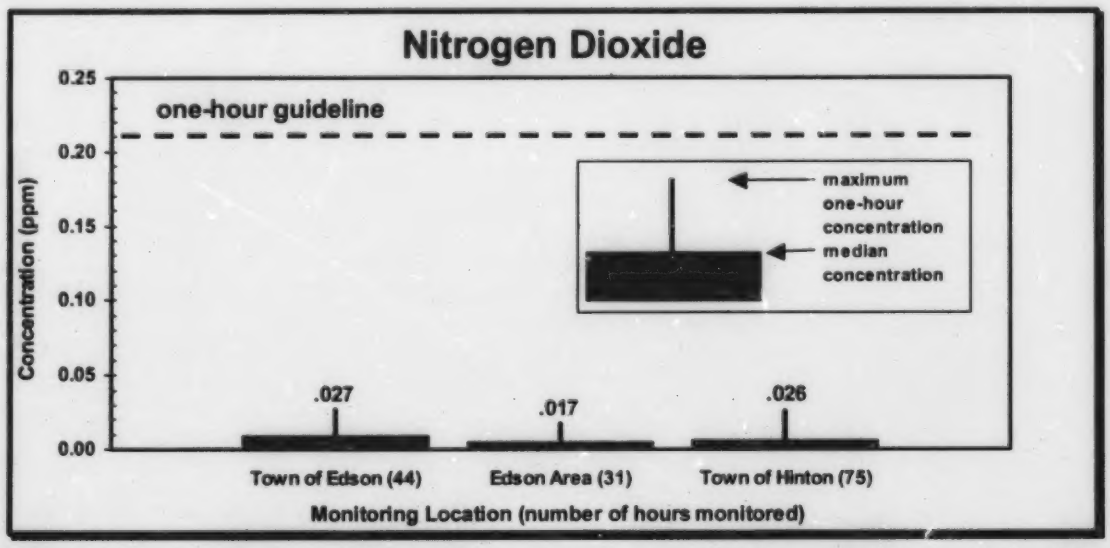

Figure 1.15 One-hour median and maximum concentrations for nitrogen dioxide.

Carbon Monoxide (CO)

maximum one-hour concentration recorded during survey	one-hour guideline
0.8 ppm	13.0 ppm (based on the oxygen-carrying capacity of blood)

Carbon monoxide (CO) is a colourless, odourless gas emitted into the atmosphere primarily by motor vehicles. Minor sources include fireplaces, industry, aircraft and natural gas combustion. The major source of carbon monoxide at urban locations is vehicle exhaust emissions.

CO values were low during the entire Edson/Hinton area survey. The maximum one-hour concentration of 0.8 ppm was recorded at two sites, Site #14 (Church on Mountain Street near Reimer Drive in Hinton) on April 19, 2000 from 10:51 a.m. to 11:58 a.m., and Site #13 (Duncan Murray Recreation Centre in Hinton) on June 15, 2000 from 2:55 p.m. to 3:53 p.m. This maximum one-hour concentration is 6 per cent of the one-hour guideline for CO. Maximum one-hour CO concentrations were 0.5 ppm or lower at the other monitoring sites during this survey. At the Edmonton and Calgary monitoring stations, based on data collected in 2000, overall maximum CO concentrations ranged from 2.7 ppm to 11.3 ppm. Small urban stations in Alberta that monitor for CO reported maximum one-hour concentrations ranging from 3.6 to 4.6 ppm, based on 2000 data.

The overall median CO concentration in the Edson/Hinton area survey was 0.1 ppm. Median CO concentrations at other mobile surveys in Alberta range from 0.2 to 0.4 ppm. At urban locations such as Edmonton and Calgary, typical median CO levels range from 0.3 to 0.6 ppm (based on 2000 data). At the small urban stations that monitor for CO, overall median CO concentrations ranged from 0.2 to 0.3 ppm, based on 2000 data. The major source of CO at urban locations is vehicle exhaust emissions. CO is also be emitted by combustion processes associated with the oil and gas industry.

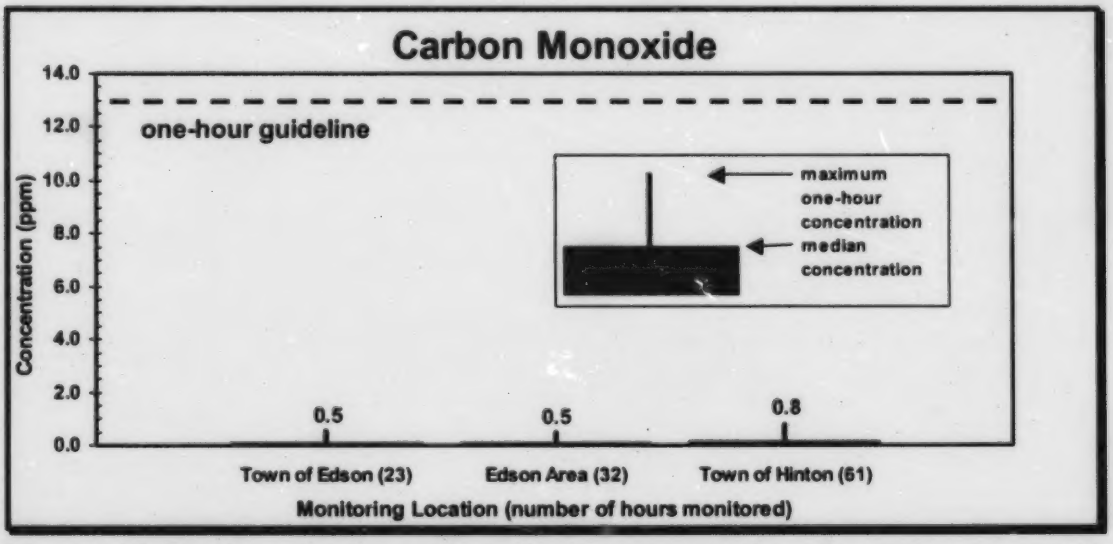

Figure 1.16 One-hour median and maximum concentrations for carbon monoxide.

Polycyclic Aromatic Hydrocarbons (PAHs)

maximum one-hour concentration recorded during survey	one-hour guideline
38 ng/m^3	no guideline

Polycyclic aromatic hydrocarbons (PAHs) are a class of chemicals that are usually contained in soot and smoke. There are more than 100 different PAHs with varying levels of toxicity. They are formed during the incomplete combustion of gasoline, diesel, oil, coal, wood, garbage or other organic substances. Tobacco smoke and charbroiled meats are common sources of PAHs. Other outdoor PAH sources include vehicle exhaust emissions, wood smoke from fireplaces, smoke from forest fires and industrial facilities. PAHs occur in the atmosphere in the vapour phase or attached to dust particles. The PAH monitoring instrument aboard the MAML will analyze only particulate bound PAHs.

The maximum one-hour average PAH concentration of 38 ng/m^3 (nanograms per cubic metre) was recorded at Site #17 (Switzer Drive near Joblin Street in Hinton) on September 16, 1999. The next highest PAH concentrations were measured at Sites #2 (Vision Park in Edson), #13 (Duncan Murray Recreation Centre in Hinton) and Site #9 (Talisman Edson facility). Maximum one-hour PAH concentrations at these three locations were 34, 28 and 25 ng/m^3, respectively. Maximum PAH levels measured during other MAML surveys in Alberta ranged from 11 ng/m^3 in the Lethbridge area to 36 ng/m^3 in the Bow Corridor area.

The overall median PAH concentration at all sites in the Edson/Hinton area survey was 1 ng/m^3. Median PAH levels measured during other MAML surveys in Alberta ranged from 2 ng/m^3 in the Lethbridge area to 4 ng/m^3 in the Bow Corridor area.

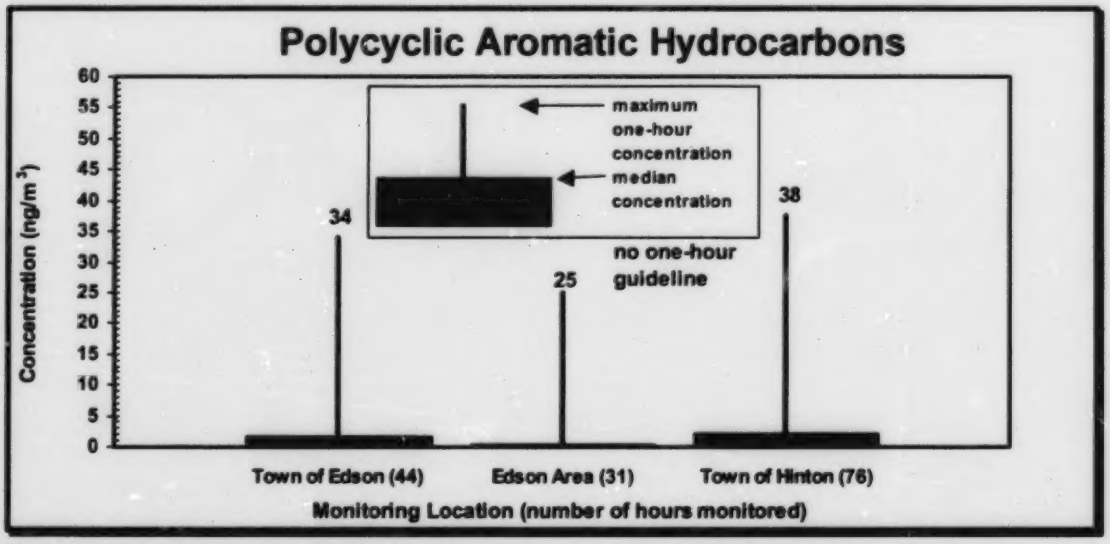

Figure 1.17 One-hour median and maximum concentrations for polycyclic aromatic hydrocarbons.

Ammonia (NH_3)

maximum one-hour concentration recorded during survey	one-hour guideline
0.020 ppm	2.0 ppm (based on odour perception)

Ammonia is a colourless gas with the well-known pungent odour found in household cleaners. NH_3 is produced both by natural and man-made sources. Some natural sources of NH_3 include the decay of plant material and animal waste. A small portion is also released during respiration. In Alberta, the fertilizer industry is the main industrial source of NH_3. The industry produces synthetic NH_3 for either direct application to soil as a fertilizer, or as a raw material for use in the production of other high nitrogen fertilizer products. The other major source of NH_3 is commercial feedlots, specifically from their large amounts of animal waste.

NH_3 levels in the Edson/Hinton area survey were very low at all monitoring sites. The highest one-hour average NH_3 concentration detected during the survey (0.020 ppm) was measured at Site #9 (Talisman Edson facility) from 7:44 a.m. to 8:49 a.m.on April 26, 2000. This NH_3 concentration is less than one per cent of the one-hour guideline. Ammonia was also detected at low levels at the remaining sites with maximum one-hour values ranging from 0.001 to 0.013 ppm. The overall median NH_3 concentration for the entire survey was 0.002 ppm. Median NH_3 concentrations at other mobile air quality surveys conducted in Alberta ranged from 0.001 ppm in the Bow Corridor and the County of Grande Prairie to 0.075 ppm in the Lethbridge area.

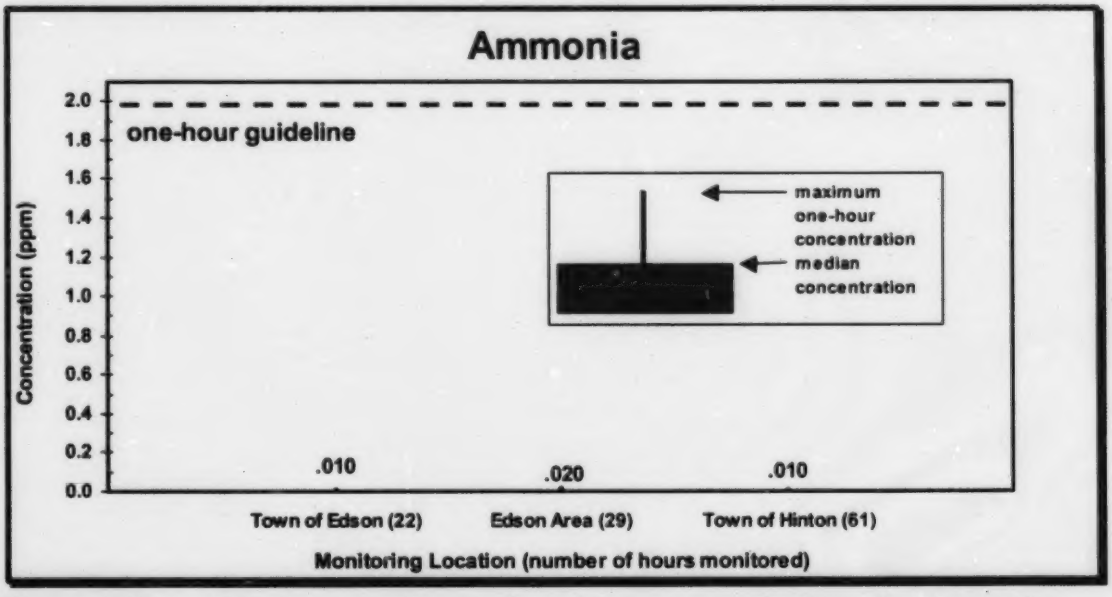

Figure 1.18 One-hour median and maximum concentrations for ammonia.

Appendix – Data Collected by the Mobile Air Monitoring Laboratory

Table A1: Median one-hour air quality parameter concentrations at each monitoring site in the Edson/Hinton areas (September 1999, February, April, and June 2000).

Area	Site (# of hours monitored)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NO_X	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	$\mu g/m^3$			ng/m^3
Town of Edson	Site #1 (7)	0.1	0.041	2.0	1.8	0.2	0.001	0.002	0.005	0.012	0.001	0.000	0.000	188	114	11	1
	Site #2 (30)	0.2	0.042	2.1	1.9	0.1	0.001	0.006	0.011	0.017	0.002	0.000	0.000	80	48	5	4
	Site #3 (7)	0.1	0.042	1.9	1.8	0.2	0.001	0.005	0.004	0.010	0.002	0.000	0.000	68	43	5	1
Overall Median (Town of Edson)		0.1	0.042	2.0	1.8	0.2	0.001	0.005	0.005	0.012	0.002	0.000	0.000	80	48	5	1
Edson Area	Site #4 (1)	0.5	0.018	2.2	1.8	0.4	0.001	0.010	0.008	0.017	0.011	0.000	0.001	289	146	9	2
	Site #5 (2)	0.1	0.027	2.0	1.6	0.4	0.002	0.003	0.003	0.005	0.003	0.012	0.013	no data			3
	Site #6 (1)	0.1	0.020	1.9	1.5	0.3	0.003	0.002	0.002	0.003	0.004	0.000	0.001				0
	Site #7 (6)	0.2	0.034	1.9	1.8	0.1	0.002	0.005	0.004	0.007	0.002	0.001	0.000	15	7	1	0
	Site #8 (5)	0.1	0.043	1.9	1.8	0.1	0.001	0.002	0.001	0.002	0.003	0.001	0.000	25	15	2	0
	Site #9 (12)	0.2	0.029	2.1	1.9	0.1	0.005	0.006	0.007	0.013	0.003	0.000	0.001	12	7	2	1
	Site #10 (2)	0.1	0.036	1.9	1.8	0.1	0.001	0.002	0.004	0.006	0.006	0.001	0.000	11	8	1	0
	Site #11 (3)	0.1	0.040	2.1	1.8	0.2	0.001	0.006	0.008	0.019	0.005	0.000	0.000	94	54	5	1
Overall Median (Edson Area)		0.1	0.032	2.0	1.8	0.2	0.001	0.004	0.004	0.007	0.004	0.000	0.000	20	11	2	1
Town of Hinton	Site #12 (4)	0.1	0.023	1.9	1.7	0.1	0.001	0.003	0.004	0.008	0.000	0.000	0.001	7	5	1	3
	Site #13 (16)	0.3	0.024	1.9	1.7	0.2	0.001	0.007	0.008	0.016	0.002	0.000	0.001	115	70	8	7
	Site #14 (9)	0.2	0.026	1.8	1.7	0.1	0.001	0.003	0.003	0.005	0.002	0.000	0.001	36	22	2	1
	Site #15 (24)	0.1	0.033	1.7	1.7	0.0	0.001	0.003	0.007	0.010	0.002	0.000	0.001	11	7	1	2
	Site #16 (10)	0.1	0.040	1.9	1.8	0.1	0.001	0.001	0.004	0.006	0.001	0.000	0.001	41	23	3	0
	Site #17 (10)	0.1	0.026	2.0	1.8	0.1	0.001	0.007	0.008	0.016	0.002	0.001	0.001	57	34	4	3
	Site #18 (3)	0.3	0.025	1.9	1.7	0.0	0.002	0.006	0.009	0.012	0.004	0.001	0.001	336	191	19	1
Overall Median (Town of Hinton)		0.1	0.026	1.9	1.7	0.1	0.001	0.003	0.007	0.010	0.002	0.000	0.001	41	23	3	2
Overall Median		**0.1**	**0.031**	**1.9**	**1.8**	**0.1**	**0.001**	**0.004**	**0.004**	**0.010**	**0.002**	**0.000**	**0.001**	**49**	**29**	**4**	**1**

no data - Indicates that the analyzer was not operational for the indicated time period.

ng/m^3 - nanograms per cubic metre of air

$\mu g/m^3$ - micrograms per cubic metre of air

ppm - parts per million

List of Air Quality Parameters

CO - carbon monoxide

O_3 - ozone

THC - total hydrocarbons

CH_4 - methane

RHC - reactive hydrocarbons

SO_2 - sulphur dioxide

NO - nitric oxide

NO_2 - nitrogen dioxide

NO_X - total oxides of nitrogen

NH_3 - ammonia

TRS - total reduced sulphur

H_2S - hydrogen sulphide

TSP - total suspended particulates

PM_{10} - inhalable particulates

$PM_{2.5}$ - respirable particulates

PAH - polycyclic aromatic hydrocarbons

Table A2: Maximum one-hour air quality parameter concentrations at each monitoring site in the Edson/Hinton areas (September 1999, February, April, and June 2000).

Area	Site (# of hours monitored)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NO_X	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		µg/m³		ng/m³
Town of Edson	Site #1 (7)	0.5	0.049	2.2	1.9	0.4	0.002	0.022	0.010	0.026	0.010	0.001	0.001	488	**322**	29	1
	Site #2 (30)	0.3	**0.055**	2.6	2.3	0.5	0.021	0.020	**0.027**	0.040	0.005	0.001	0.001	402	253	25	34
	Site #3 (7)	0.3	0.048	2.1	1.9	0.2	0.004	0.014	0.015	0.024	0.005	0.001	0.001	289	154	15	7
Overall Maximum (Town of Edson)		0.5	0.055	2.6	2.3	0.5	0.021	0.022	0.027	0.040	0.010	0.001	0.001	488	322	29	34
Edson Area	Site #4 (1)	0.5	0.018	2.2	1.8	0.4	0.001	0.010	0.008	0.017	0.011	0.000	0.001	289	146	9	2
	Site #5 (2)	0.3	0.027	2.1	1.6	0.5	0.002	0.005	0.004	0.006	0.005	**0.024**	**0.024**	no data			6
	Site #6 (1)	0.1	0.020	1.9	1.5	0.3	0.003	0.002	0.002	0.003	0.004	0.000	0.001				0
	Site #7 (6)	0.4	0.048	2.2	2.0	0.2	0.006	0.014	0.017	0.027	0.007	0.003	0.005	25	15	2	1
	Site #8 (5)	0.3	0.047	2.1	2.0	0.2	0.012	0.005	0.009	0.013	0.009	0.001	0.002	200	119	12	1
	Site #9 (12)	0.5	0.046	**3.0**	**2.4**	**0.6**	**0.023**	0.026	0.016	0.045	**0.020**	0.002	0.001	73	40	12	25
	Site #10 (2)	0.1	0.045	2.0	1.8	0.1	0.001	0.005	0.007	0.012	0.012	0.001	0.000	17	12	2	0
	Site #11 (3)	0.2	0.046	2.3	1.8	0.3	0.003	0.030	0.012	0.037	0.013	0.001	0.002	176	101	8	7
Overall Maximum (Edson Area)		0.5	0.048	3.0	2.4	0.6	0.023	0.030	0.017	0.045	0.020	0.024	0.024	289	146	12	25
Town of Hinton	Site #12 (4)	0.2	0.030	2.0	1.8	0.2	0.002	0.015	0.009	0.025	0.001	0.004	0.004	31	18	1	6
	Site #13(16)	**0.8**	0.048	2.1	2.0	0.4	0.005	0.035	0.025	0.060	0.009	0.005	0.005	476	280	28	28
	Site #14 (9)	**0.8**	0.052	1.9	1.8	0.2	0.002	0.032	0.024	0.052	0.010	0.001	0.001	**515**	318	**34**	9
	Site #15 (24)	0.3	0.043	2.0	1.9	0.2	0.005	0.020	0.026	0.040	0.003	0.001	0.003	269	168	16	18
	Site #16 (10)	0.5	0.053	2.0	1.9	0.2	0.015	0.006	0.016	0.021	0.002	0.002	0.003	154	90	9	2
	Site #17 (10)	0.5	0.051	2.1	1.9	0.2	0.008	**0.055**	0.015	**0.065**	0.004	0.008	0.007	225	122	11	**38**
	Site #18 (3)	0.4	0.041	1.9	1.9	0.1	0.003	0.017	0.020	0.037	0.005	0.001	0.002	399	241	24	6
Overall Maximum ((Town of Hinton)		0.8	0.053	2.1	2.0	0.4	0.015	0.055	0.026	0.065	0.010	0.008	0.007	515	318	34	38
Overall Maximum		**0.8**	**0.055**	**3.0**	**2.4**	**0.6**	**0.023**	**0.055**	**0.027**	**0.065**	**0.020**	**0.024**	**0.024**	**515**	**322**	**34**	**38**
One-Hour Guideline		**13.0**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2.0**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

n/a No one hour guideline.

no data - Indicates that the analyzer was not operational for the indicated time period.

ng/m³ - nanograms per cubic metre of air

µg/m³ - micrograms per cubic metre of air

ppm - parts per million

List of Air Quality Parameters

CO - carbon monoxide
O_3 - ozone
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NO - nitric oxide
NO_2 - nitrogen dioxide
NO_X - total oxides of nitrogen
NH_3 - ammonia
TRS - total reduced sulphur
H_2S - hydrogen sulphide
TSP - total suspended particulates
PM_{10} - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

Table A3: Median one-hour air quality parameter concentrations in Alberta*.

Air Quality Station	Station or Survey Type	Monitoring Period	CO (ppm)	O_3 (ppm)	THC (ppm)	CH_4 (ppm)	RHC (ppm)	SO_2 (ppm)	NO_2 (ppm)	NH_3 (ppm)	TRS (ppm)	H_2S (ppm)	TSP µg/m³	PM_{10} µg/m³	$PM_{2.5}$ µg/m³	PAHs ng/m³
Edson and Hinton[1]	mobile survey	Sept. 1999 to June 2000	0.1	0.031	1.9	1.8	0.1	0.001	0.004	0.002	0.000	0.001	49	29	4	1
Bow Corridor[1]	mobile survey	Dec. 1999 to Sep. 2000	0.2	0.030	1.9	1.8	0.1	0.001	0.007	0.001	0.001	0.000	74	40	4	4
County of Grande Prairie[1]	mobile survey	Dec. 1998 to Oct. 1999	0.2	0.036	2.0	1.7	0.2	0.001	0.002	0.001	0.000	0.000	14	9	2	2
Caroline/Sundre area[1]	mobile survey	Apr. 1997 to Apr. 1998	0.3	0.042	2.1	1.8	0.2	0.002	0.009	n/a	0.000	0.000	4	3	1	n/a
City of Lethbridge[1]	mobile survey	Sep. 1998 to Jul. 1999	0.2	0.046	1.9	1.6	0.2	0.000	0.003	0.005	0.000	0.001	17	11	2	3
City of Medicine Hat[1]	mobile survey	May 1998 to Jan. 1999	0.4	0.031	2.1	1.8	0.2	0.001	0.009	0.003	0.000	0.000	16	11	2	5
Lethbridge area (Picture Butte, Sterling)[1]	mobile survey	Sep. 1998 to Jul. 1999	0.2	0.044	2.1	1.8	0.2	0.001	0.002	0.075	0.002	0.001	42	24	3	2
Beaverlodge[2]	rural	Jan. to Dec. 2000	n/a	0.027	n/a	n/a	n/a	0.000	0.002	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Calgary Central[2]	urban	Jan. to Dec. 2000	0.6	0.012	2.0	n/a	n/a	n/a	0.027	n/a	n/a	n/a	n/a	18	9	n/a
Calgary East[2]	urban	Jan. to Dec. 2000	0.5	0.013	2.2	n/a	n/a	0.002	0.023	n/a	n/a	0.001	n/a	n/a	n/a	n/a
Calgary Northwest[2]	urban	Jan. to Dec. 2000	0.3	0.020	2.1	n/a	n/a	n/a	0.014	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Edmonton Central[2]	urban	Jan. to Dec. 2000	0.6	0.013	1.9	n/a	n/a	n/a	0.023	n/a	n/a	n/a	n/a	n/a	9	n/a
Edmonton East[2]	urban	Jan. to Dec. 2000	0.3	0.019	2.3	n/a	n/a	0.002	0.015	n/a	n/a	0.000	n/a	15	8	n/a
Edmonton Northwest[2]	urban	Jan. to Dec. 2000	0.4	0.015	2.2	n/a	n/a	n/a	0.018	n/a	n/a	n/a	n/a	17	9	n/a
Fort Saskatchewan[2]	small urban	Jan. to Dec. 2000	0.3	0.020	1.9	n/a	n/a	0.001	0.009	0.003	n/a	0.000	n/a	n/a	n/a	n/a
Red Deer	small urban	Jan. to Dec. 2000	0.2	0.018	2.2	n/a	n/a	0.000	0.010	n/a	n/a	0.000	n/a	14	n/a	n/a
Buffalo Viewpoint[3]	industrial	Jan. to Dec. 2000	n/a	n/a	1.9	n/a	n/a	0.000	n/a	n/a	n/a	0.000	n/a	n/a	n/a	n/a
Fort Chipewyan[3]	rural	Jan. to Dec. 2000	n/a	0.027	n/a	n/a	n/a	0.000	0.000	n/a	n/a	n/a	n/a	n/a	3	n/a
Fort McKay[3]	rural	Jan. to Dec. 2000	n/a	0.019	1.8	n/a	n/a	0.000	0.004	n/a	0.000	n/a	n/a	n/a	5	n/a
Fort McMurray (Athabasca Valley)[3]	small urban	Jan. to Dec. 2000	0.2	0.015	1.9	n/a	n/a	0.000	0.007	n/a	0.000	n/a	n/a	n/a	5	n/a
Fort McMurray (Patricia McInnes)[3]	small urban	Jan. to Dec. 2000	n/a	0.022	1.9	n/a	n/a	0.000	0.003	n/a	0.000	n/a	n/a	n/a	5	n/a
Lower Camp[3]	industrial	Jan. to Dec. 2000	n/a	n/a	1.9	n/a	n/a	0.001	n/a	n/a	n/a	0.001	n/a	n/a	n/a	n/a
Mannix[3]	industrial	Jan. to Dec. 2000	n/a	n/a	1.9	n/a	n/a	0.001	n/a	n/a	n/a	0.000	n/a	n/a	n/a	n/a
Mildred Lake[3]	industrial	Jan. to Dec. 2000	n/a	n/a	2.0	n/a	n/a	0.001	n/a	n/a	n/a	0.000	n/a	n/a	n/a	n/a
Carrot Creek[4]	rural	Jan. to Dec. 2000	n/a	0.027	n/a	n/a	n/a	0.001	0.004	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hightower Ridge[4]	background	Jan. to Dec. 2000	n/a	0.045	n/a	n/a	n/a	0.000	0.000	n/a	n/a	n/a	n/a	5	3	n/a
Steeper[4]	rural	Jan. to Dec. 2000	n/a	0.040	n/a	n/a	n/a	0.000	0.001	n/a	n/a	n/a	n/a	6	n/a	n/a
Tomahawk[4]	rural	Jan. to Dec. 2000	n/a	0.029	n/a	n/a	n/a	0.001	0.003	n/a	n/a	n/a	n/a	8	4	n/a
Violet Grove[4]	rural	Jan. to Dec. 2000	n/a	0.034	2.1	2.1	0.2	0.000	0.002	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sherwood Park[5]	small urban	Jan. to Dec. 2000	n/a	n/a	2.0	n/a	n/a	0.001	n/a	n/a	n/a	0.000	n/a	n/a	n/a	n/a
Caroline[6]	rural	Aug. to Dec. 2000	n/a	0.026	2.2	2.0	n/a	0.001	0.003	n/a	0.000	0.000	n/a	n/a	n/a	n/a

1 Mobile survey conducted by Alberta Environment.
2 Station operated by Alberta Environment.
3 Station operated by the Wood Buffalo Environmental Association
4 Station operated by the West Central Airshed Society.
5 Station operated by the Strathcona Industrial Association.
6 Station operated by the Parkland Airshed Management Association.
n/a Parameter not monitored or data not available.
* Data is from the Alberta Ambient Air Data Management System (http://www.casadata.org).

Table A4: Maximum one-hour air quality parameter concentrations in Alberta*.

Air Quality Station	Station or Survey Type	Monitoring Period	CO (ppm)	O_3 (ppm)	THC (ppm)	CH_4 (ppm)	RHC (ppm)	SO_2 (ppm)	NO_2 (ppm)	NH_3 (ppm)	TRS (ppm)	H_2S (ppm)	TSP µg/m³	PM_{10} µg/m³	$PM_{2.5}$ µg/m³	PAHs ng/m³
Edson and Hinton[1]	mobile survey	Sept. 1999 to June 2000	0.8	0.055	3.0	2.4	0.6	0.023	0.027	0.020	0.024	0.024	515	322	34	38
Bow Corridor[1]	mobile survey	Dec. 1999 to Sep. 2000	1.1	0.056	7.8	2.2	6.6	0.092	0.031	0.034	0.004	0.002	2082	1094	60	36
County of Grande Prairie[1]	mobile survey	Dec. 1998 to Oct. 1999	1.0	0.064	32.4	6.4	29.4	0.043	0.061	0.030	0.010	0.009	2305	1287	101	35
Caroline/Sundre area[1]	mobile survey	Apr. 1997 to Apr. 1998	0.9	0.059	2.9	2.6	0.7	0.043	0.040	n/a	0.008	0.008	52	43	17	n/a
City of Lethbridge[1]	mobile survey	Sep. 1998 to Jul. 1999	2.4	0.062	2.2	1.9	0.4	0.007	0.016	0.020	0.001	0.003	405	363	294	21
City of Medicine Hat[1]	mobile survey	May 1998 to Jan. 1999	2.8	0.062	2.6	2.3	0.4	0.029	0.080	0.027	0.001	0.004	213	135	12	35
Lethbridge area (Picture Butte, Sterling)[1]	mobile survey	Sep. 1998 to Jul. 1999	1.2	0.059	9.5	7.1	1.6	0.004	0.013	1.364	0.054	0.054	490	298	32	11
Beaverlodge[2]	rural	Jan. to Dec. 2000	n/a	0.064	n/a	n/a	n/a	0.038	0.029	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Calgary Central[2]	urban	Jan. to Dec. 2000	6.1	0.058	4.3	n/a	n/a	n/a	0.100	n/a	n/a	n/a	n/a	291	112	n/a
Calgary East[2]	urban	Jan. to Dec. 2000	6.2	0.064	5.0	n/a	n/a	0.072	0.101	n/a	n/a	0.022	n/a	n/a	n/a	n/a
Calgary Northwest[2]	urban	Jan. to Dec. 2000	6.5	0.067	4.8	n/a	n/a	n/a	0.089	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Edmonton Central[2]	urban	Jan. to Dec. 2000	11.3	0.064	4.8	n/a	n/a	n/a	0.083	n/a	n/a	n/a	n/a	n/a	40	n/a
Edmonton East[2]	urban	Jan. to Dec. 2000	2.7	0.072	24.2	n/a	n/a	0.057	0.082	n/a	n/a	0.029	n/a	395	60	n/a
Edmonton Northwest[2]	urban	Jan. to Dec. 2000	7.7	0.066	7.1	n/a	n/a	n/a	0.094	n/a	n/a	n/a	n/a	294	231	n/a
Fort Saskatchewan[2]	small urban	Jan. to Dec. 2000	4.6	0.075	4.3	n/a	n/a	0.025	0.081	0.154	n/a	0.006	n/a	n/a	n/a	n/a
Red Deer	small urban	Jan. to Dec. 2000	3.6	0.065	11.4	n/a	n/a	0.017	0.060	n/a	n/a	0.013	n/a	382	n/a	n/a
Buffalo Viewpoint[3]	industrial	Jan. to Dec. 2000	n/a	n/a	9.5	n/a	n/a	0.184	n/a	n/a	n/a	0.021	n/a	n/a	n/a	n/a
Fort Chipewyan[3]	rural	Jan. to Dec. 2000	n/a	0.051	n/a	n/a	n/a	0.013	0.028	n/a	n/a	n/a	n/a	n/a	16	n/a
Fort McKay[3]	rural	Jan. to Dec. 2000	n/a	0.060	3.5	n/a	n/a	0.123	0.036	n/a	0.051	n/a	n/a	n/a	48	n/a
Fort McMurray (Athabasca Valley)[3]	small urban	Jan. to Dec. 2000	4.4	0.065	4.2	n/a	n/a	0.033	0.052	n/a	0.006	n/a	n/a	n/a	121	n/a
Fort McMurray (Patricia McInnes)[3]	small urban	Jan. to Dec. 2000	n/a	0.058	4.0	n/a	n/a	0.052	0.037	n/a	0.007	n/a	n/a	n/a	149	n/a
Lower Camp[3]	industrial	Jan. to Dec. 2000	n/a	n/a	6.1	n/a	n/a	0.107	n/a	n/a	n/a	0.088	n/a	n/a	n/a	n/a
Mannix[3]	industrial	Jan. to Dec. 2000	n/a	n/a	5.9	n/a	n/a	0.284	n/a	n/a	n/a	0.020	n/a	n/a	n/a	n/a
Mildred Lake[3]	industrial	Jan. to Dec. 2000	n/a	n/a	15.1	n/a	n/a	0.225	n/a	n/a	n/a	0.099	n/a	n/a	n/a	n/a
Carrot Creek[4]	rural	Jan. to Dec. 2000	n/a	0.078	n/a	n/a	n/a	0.023	0.046	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hightower Ridge[4]	background	Jan. to Dec. 2000	n/a	0.081	n/a	n/a	n/a	0.009	0.015	n/a	n/a	n/a	n/a	41	19	n/a
Steeper[4]	rural	Jan. to Dec. 2000	n/a	0.080	n/a	n/a	n/a	0.006	0.023	n/a	n/a	n/a	n/a	198	n/a	n/a
Tomahawk[4]	rural	Jan. to Dec. 2000	n/a	0.075	n/a	n/a	n/a	0.034	0.037	n/a	n/a	n/a	n/a	197	37	n/a
Violet Grove[4]	rural	Jan. to Dec. 2000	n/a	0.075	19.4	2.9	4.9	0.018	0.034	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sherwood Park[5]	small urban	Jan. to Dec. 2000	n/a	n/a	4.9	n/a	n/a	0.053	n/a	n/a	n/a	0.005	n/a	n/a	n/a	n/a
Caroline[6]	rural	Jan. to Dec. 2000	n/a	0.065	7.8	4.1	n/a	0.070	0.031	n/a	0.019	0.016	n/a	n/a	n/a	n/a

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n/a Parameter not monitored or data not available.
* Data is from the Alberta Ambient Air Data Management System (http://www.casadata.org).

Table A5: One-hour average air quality parameter concentrations in the Edson/Hinton Areas (September 13, 14, 15 and 16, 1999).

Area	Site #	Date	Monitoring Time (MST)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NOx	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	$\mu g/m^3$			ng/m^3
Edson Area	Site # 5	13-Sep-99	(11:39 a.m. to 12:39 p.m.)	0.0	0.027	2.1	1.6	0.5	0.002	0.005	0.004	0.006	0.005	**0.024**	**0.024**	no data			6
	Site # 9		(2:38 p.m. to 3:35 p.m.)	0.3	0.031	*2.0*	*1.6*	*0.2*	0.012	0.001	*0.002*	*0.001*	*0.002*	0.000	0.001				*0*
	Site # 9		(3:43 p.m. to 4:40 p.m.)	0.3	0.030	2.0	1.7	0.1	0.005	0.001	0.002	0.003	0.003	0.000	0.000				1
Edson Area	Site # 11	14-Sep-99	(7:48 a.m. to 8:48 a.m.)	0.2	0.004	2.3	1.8	0.3	0.003	0.030	0.008	0.037	0.005	0.001	0.002	no data			7
	Site # 6		(9:20 a.m. to 10:20 a.m.)	0.1	0.020	1.9	1.5	0.3	0.003	0.002	0.002	0.003	0.004	0.000	0.001				0
	Site # 5		(11:24 a.m. to 12:19 p.m.)	0.3	0.026	1.9	1.6	0.2	0.001	0.001	0.003	0.004	0.002	0.001	0.003				0
	Site # 9		(1:49 p.m. to 2:55 p.m.)	0.0	0.046	1.7	1.5	0.2	0.004	0.000	0.002	0.002	0.001	0.000	0.000				0
Town of Edson	Site # 1		(3:44 p.m. to 5:15 p.m.)	0.1	0.049	1.8	1.5	0.2	0.002	0.000	0.001	0.001	0.001	0.000	0.000				0
	Site # 3		(5:26 p.m. to 6:29 p.m.)	0.3	0.035	1.9	1.6	0.2	0.002	0.014	0.010	0.023	0.002	0.000	0.000				7
Edson Area	Site # 9		(6:51 p.m. to 7:52 p.m.)	0.2	0.016	**3.0**	**2.4**	**0.6**	0.002	0.003	0.011	0.015	0.001	0.000	0.000				1
Town of Hinton	Site # 12	15-Sep-99	(8:42 a.m. to 9:43 a.m.)	0.0	0.014	1.9	1.6	0.2	0.002	0.015	0.009	0.025	0.000	0.004	0.004	no data			6
	Site # 13		(10:07 a.m. to 11:07 a.m.)	0.0	0.017	1.8	1.5	0.3	0.002	0.016	0.010	0.026	0.001	0.000	0.001				12
	Site # 14		(11:57 a.m. to 12:56 p.m.)	0.1	0.035	1.7	1.4	0.2	0.001	0.003	0.002	0.002	0.002	0.000	0.001				1
	Site # 15		(1:04 p.m. to 2:02 p.m.)	0.0	0.042	1.7	1.4	0.2	0.002	0.000	0.000	0.001	0.001	0.001	0.000				1
	Site # 16		(2:17 p.m. to 3:18 p.m.)	0.0	0.044	1.8	1.6	0.1	0.002	0.000	0.001	0.001	0.001	0.001	0.000				0
	Site # 13		(4:13 p.m. to 5:12 p.m.)	0.3	0.030	1.8	1.6	0.2	0.002	0.006	0.008	0.014	0.002	0.001	0.000				7
	Site # 14		(5:39 p.m. to 6:39 p.m.)	0.1	0.020	1.8	1.6	0.1	0.002	0.001	0.001	0.003	0.001	0.001	0.000				0
Town of Hinton	Site # 17	16-Sep-99	(7:49 a.m. to 9:15 a.m.)	0.5	0.002	2.0	1.7	0.2	0.002	**0.055**	0.010	**0.065**	0.000	0.008	0.007	no data			**38**
	Site # 13		(9:17 a.m. to 10:33 a.m.)	0.3	0.009	1.9	1.6	0.2	0.002	0.030	0.011	0.041	0.001	0.001	0.001				28
	Site # 14		(10:45 a.m. to 11:49 a.m.)	*0.3*	*0.023*	*1.8*	*1.5*	*0.2*	0.002	*0.006*	*0.004*	*0.009*	*0.003*	0.000	0.000				*2*
	Site # 15		(12:15 p.m. to 1:16 p.m.)	0.2	0.036	1.8	1.6	0.2	0.003	0.002	0.005	0.006	0.002	0.001	0.000				0
	Site # 16		(1:25 p.m. to 2:26 p.m.)	0.2	0.043	1.8	1.6	0.2	0.006	0.002	0.005	0.008	0.001	0.002	0.002				0
	Site # 17		(2:31 p.m. to 3:33 p.m.)	0.1	0.038	1.8	1.6	0.1	0.005	0.004	0.005	0.008	0.002	0.002	0.002				2
	Site # 13		(3:50 p.m. to 4:51 p.m.)	0.1	0.039	2.0	1.7	0.2	0.001	0.002	0.002	0.003	0.002	0.005	0.005				1
	Site # 13		(5:03 p.m. to 6:05 p.m.)	0.3	0.031	1.8	1.6	0.2	0.001	0.006	0.007	0.013	0.001	0.001	0.001				8
One-hour guideline				**13.0**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2.0**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

n/a No one hour guideline.
no data - Indicates that the analyzer was not operational for the indicated time period.
Data in *italics* indicates less than 75% data available for the hour.
ng/m^3 - nanograms per cubic metre of air
$\mu g/m^3$ micrograms per cubic metre of air
ppm - parts per million
Data in **bold** indicates the maximum concentration measured during the survey.

List of Air Quality Parameters

CO - carbon monoxide
O_3 - ozone
THC - total hydrocarbons
CH_4 - methane
RHC - reactive hydrocarbons
SO_2 - sulphur dioxide
NO - nitric oxide
NO_2 - nitrogen dioxide
NO_X - total oxides of nitrogen
NH_3 - ammonia
TRS - total reduced sulphur
H_2S - hydrogen sulphide
TSP - total suspended particulates
PM_{10} - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

Table A6: One-hour average air quality parameter concentrations in the Edson/Hinton Areas (February 7, 8, 9, 17 and 18, 2000).

Area	Site #	Date	Monitoring Time (MST)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NOx	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		$\mu g/m^3$		ng/m^3
Town of Hinton	Site # 14	7-Feb-00	(1:28 p.m. to 2:37 p.m.)	0.3	0.041	1.8	1.8	0.0	0.000	0.002	0.004	0.005	0.008	0.001	0.001	24	11	1	1
	Site # 15		(2:43 p.m. to 3:51 p.m.)	0.2	0.040	*1.8*	*1.7*	*0.1*	0.001	0.001	0.004	0.005	0.003	0.000	0.000	11	7	1	1
	Site # 13		(4:01 p.m. to 5:05 p.m.)	0.1	0.032	1.9	1.8	0.0	0.000	0.008	0.010	0.018	0.002	0.000	0.000	120	70	8	5
	Site # 16		(5:17 p.m. to 6:18 p.m.)	0.2	0.028	1.9	1.8	0.1	0.015	0.005	0.016	0.021	0.000	0.002	0.002	45	25	5	1
	Site # 17		(6:25 p.m. to 7:27 p.m.)	0.0	0.031	1.9	1.8	0.1	0.008	0.007	0.011	0.018	0.002	0.004	0.003	71	39	6	1
	Site # 16		(7:32 p.m. to 8:34 p.m.)	0.0	0.038	1.9	1.8	0.0	0.000	0.001	0.003	0.004	0.000	0.000	0.000	19	10	1	1
	Site # 15		(8:44 p.m. to 9:43 p.m.)	0.1	0.035	1.9	1.8	0.0	0.000	0.004	0.004	0.007	0.002	0.000	0.000	41	26	3	5
Town of Hinton	Site # 15	8-Feb-00	(8:15 a.m. to 9:20 a.m.)	0.1	0.032	1.7	1.7	0.0	0.001	0.007	0.011	0.018	0.002	0.001	0.000	171	92	7	2
	Site # 16		(9:40 a.m. to 10:54 a.m.)	0.2	0.025	1.9	1.9	0.0	0.002	0.006	0.012	0.017	0.002	0.001	0.001	42	22	2	2
	Site # 17		(11:00 a.m. to 11:58 a.m.)	0.1	0.033	2.1	1.9	0.1	0.002	0.006	0.005	0.010	0.002	0.006	0.004	66	38	5	1
	Site # 13		(12:08 p.m. to 1:10 p.m.)	0.3	0.030	2.0	1.9	0.1	0.002	0.013	0.008	0.020	0.004	0.001	0.001	115	70	8	5
	Site # 14		(2:30 p.m. to 3:56 p.m.)	0.4	0.030	1.9	1.8	0.1	0.002	0.007	0.008	0.015	0.002	0.001	0.001	66	35	3	1
	Site # 13		(4:03 p.m. to 5:04 p.m.)	0.3	0.025	1.9	2.0	0.0	0.001	0.001	0.004	0.005	0.001	0.001	0.001	7	4	0	1
	Site # 18		(5:20 p.m. to 6:19 p.m.)	0.0	0.022	1.9	1.9	0.0	0.001	0.003	0.009	0.012	0.001	0.001	0.002	22	6	1	1
	Site # 15		(6:36 p.m. to 7:39 p.m.)	0.0	0.027	1.7	1.7	0.1	0.001	0.001	0.003	0.004	0.001	0.001	0.000	21	6	0	0
Town of Edson	Site # 2	9-Feb-00	(9:43 a.m. to 10:47 a.m.)	0.0	0.028	1.8	1.8	0.0	0.001	0.007	0.004	0.011	0.001	0.000	0.000	6	3	1	1
	Site # 1		(11:14 a.m. to 12:18 p.m.)	0.0	0.028	1.9	1.8	0.0	0.001	0.008	0.004	0.012	0.002	0.000	0.000	28	6	1	1
	Site # 2		(12:29 p.m. to 1:37 p.m.)	0.0	0.024	2.0	1.9	0.0	0.002	0.020	0.012	0.031	0.003	0.000	0.000	10	4	2	4
Edson Area	Site # 9		(2:05 p.m. to 3:12 p.m.)	0.0	0.025	2.0	1.9	0.1	**0.023**	0.006	0.007	0.013	0.001	0.001	0.001	6	4	1	1
Edson Area	Site # 9	17-Feb-00	(2:28 p.m. to 3:25 p.m.)	0.5	0.042	no data	0.0	0.0	0.008	0.008	0.008	0.017	0.004	0.001	0.001	16	8	2	21
	Site # 11		(3:53 p.m. to 4:58 p.m.)	0.1	0.040		0.0	0.0	0.001	0.006	0.005	0.012	0.004	0.000	0.000	11	7	1	0
	Site # 7		(5:52 p.m. to 6:55 p.m.)	0.4	0.036		0.0	0.0	0.001	0.011	0.009	0.021	0.004	0.003	0.005	2	2	0	0
Town of Edson	Site # 1		(7:37 p.m. to 8:37 p.m.)	0.0	0.021		0.0	0.0	0.000	0.002	0.010	0.013	0.001	0.000	0.000	4	3	1	1
Edson Area	Site # 9	18-Feb-00	(9:15 a.m. to 10:30 a.m.)	0.4	0.028	2.2	2.0	0.1	0.002	0.022	0.016	0.038	0.000	0.001	0.000	52	36	12	25
	Site # 7		(11:24 a.m. to 12:24 p.m.)	0.3	0.033	2.2	2.0	0.1	0.001	0.014	0.017	0.027	0.003	0.001	0.001	15	10	2	1
	Site # 8		(2:04 p.m. to 3:07 p.m.)	0.2	0.043	2.1	2.0	0.1	0.000	0.000	0.001	0.001	0.000	0.001	0.000	3	2	0	0
One-hour guideline				**13.0**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2.0**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

n/a No one hour guideline.
no data - Indicates that the analyzer was not operational for the indicated time period.
Data in *italics* indicates less than 75% data available for the hour.
ng/m^3 - nanograms per cubic metre of air
$\mu g/m^3$ - micrograms per cubic metre of air
ppm - parts per million
Data in **bold** indicates the maximum concentration measured during the survey.

List of Air Quality Parameters

CO - carbon monoxide
O_3 - ozone
THC - total hydrocarbons
CH_4 - methane
RHC - reactive hydrocarbons
SO_2 - sulphur dioxide
NO - nitric oxide
NO_2 - nitrogen dioxide
NO_X - total oxides of nitrogen
NH_3 - ammonia
TRS - total reduced sulphur
H_2S - hydrogen sulphide
TSP - total suspended particulates
PM_{10} - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

Table A7: One-hour average air quality parameter concentrations in the Edson/Hinton Areas (April 18, 19, 25, 26 and 27, 2000).

Area	Site #	Date	Monitoring Time (MST)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NOx	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	$\mu g/m^3$			ng/m^3
Town of Hinton	Site # 14	18-Apr-00	(11:53 a.m. to 12:48 p.m.)	0.3	0.052	1.9	1.8	0.1	0.000	0.002	0.001	0.003	0.005	0.000	0.001	49	33	4	1
	Site # 16		(1:01 p.m. to 1:57 p.m.)	0.1	0.053	1.9	1.8	0.1	0.000	0.000	0.001	0.001	0.001	0.000	0.001	30	21	3	0
	Site # 17		(2:04 p.m. to 2:59 p.m.)	0.1	0.051	2.0	1.8	0.1	0.001	0.002	0.004	0.006	0.001	0.000	0.001	28	20	3	3
	Site # 13		(3:07 p.m. to 3:59 p.m.)	0.3	0.048	2.1	1.9	0.2	0.001	0.005	0.007	0.012	0.005	0.000	0.001	139	88	10	4
	Site # 16		(4:06 p.m. to 4:58 p.m.)	0.2	0.052	2.0	1.9	0.1	0.001	0.001	0.001	0.002	0.000	0.000	0.000	39	26	4	0
	Site # 15		(5:58 p.m. to 7:04 p.m.)	0.2	0.043	2.0	1.9	0.1	0.001	0.006	0.009	0.015	0.002	0.000	0.000	106	66	8	4
Town of Hinton	Site # 15	19-Apr-00	(7:07 a.m. to 8:16 a.m.)	0.3	0.010	1.9	1.8	0.0	0.000	0.020	0.022	0.040	0.002	0.000	0.001	269	168	16	5
	Site # 13		(8:26 a.m. to 9:29 a.m.)	0.4	0.008	2.0	1.7	0.1	0.000	0.024	0.024	0.048	0.002	0.000	0.001	476	280	28	13
	Site # 16		(9:37 a.m. to 10:36 a.m.)	0.5	0.021	1.8	1.7	0.0	0.000	0.005	0.013	0.017	0.000	0.000	0.001	154	90	9	1
	Site # 14		(10:51 a.m. to 11:58 a.m.)	**0.8**	0.014	1.8	1.6	0.1	0.000	0.032	0.024	0.052	0.003	0.000	0.001	**515**	318	**34**	9
	Site # 18		(12:10 p.m. to 1:10 p.m.)	0.4	0.025	1.9	1.7	0.1	0.003	0.017	0.020	0.037	0.004	0.001	0.001	399	241	24	6
	Site # 18		(1:21 p.m. to 2:20 p.m.)	0.3	0.041	1.8	1.7	0.0	0.002	0.006	0.007	0.012	0.005	0.000	0.000	336	191	19	1
	Site # 16		(2:32 p.m. to 3:31p.m.)	0.1	0.043	1.8	1.7	0.0	0.001	0.001	0.002	0.003	0.001	0.000	0.000	76	48	6	0
	Site # 13		(3:39 p.m. to 4:39 p.m.)	0.3	0.038	1.8	1.7	0.1	0.001	0.006	0.006	0.012	0.004	0.000	0.000	247	159	18	13
Edson Area	Site # 7	25-Apr-00	(2:40 p.m. to 3:38 p.m.)	0.2	0.048	1.9	1.8	0.1	0.002	0.000	0.001	0.002	0.000	0.000	0.000	17	12	2	0
Town of Edson	Site # 3		(4:04 p.m. to 5:06 p.m.)	0.1	0.046	2.0	1.8	0.2	0.004	0.005	0.007	0.012	0.002	0.001	0.000	289	154	15	5
	Site # 1		(5:40 p.m. to 6:44 p.m.)	0.0	0.044	2.0	1.8	0.2	0.002	0.002	0.005	0.006	0.001	0.000	0.000	488	**322**	29	1
Edson Area	Site # 9	26-Apr-00	(7:44 a.m. to 8:49 a.m.)	0.0	0.037	2.6	2.3	0.5	0.015	0.026	0.015	0.045	**0.020**	0.002	0.001	73	40	5	2
	Site # 10		(9:04 a.m. to 10:02 a.m.)	0.0	0.045	2.0	1.8	0.1	0.001	0.005	0.007	0.012	0.012	0.001	0.000	17	12	2	0
	Site # 11		(11:15 a.m. to 12:24 p.m.)	0.1	0.046	2.0	1.8	0.2	0.000	0.006	0.012	0.019	0.013	0.000	0.000	176	101	8	1
	Site # 8		(1:17 p.m. to 2:40 p.m.)	0.1	0.047	1.9	1.8	0.2	0.012	0.003	0.009	0.013	0.009	0.001	0.002	25	15	2	0
	Site # 7		(3:46 p.m. to 4:43 p.m.)	0.0	0.045	1.9	1.9	0.2	0.005	0.005	0.006	0.012	0.002	0.001	0.001	25	15	2	0
Town of Edson	Site # 3		(5:03 p.m. to 6:06 p.m.)	0.0	0.045	1.8	1.9	0.1	0.000	0.001	0.001	0.002	0.000	0.001	0.001	30	17	2	0
	Site # 1		(6:19 p.m. to 7:32 p.m.)	0.1	0.041	2.2	1.8	0.4	0.000	0.004	0.010	0.016	0.005	0.001	0.001	292	166	13	1
Edson Area	Site # 9	27-Apr-00	(7:39 a.m. to 8:42 a.m.)	0.3	0.040	2.1	1.9	0.2	0.005	0.004	0.007	0.012	no data	0.002	0.001	47	30	4	0
Town of Edson	Site # 3		(9:15 a.m. to 10:15 a.m.)	0.3	0.042	2.1	1.9	0.2	0.002	0.008	0.015	0.024		0.001	0.001	145	84	9	3
	Site # 1		(10:35 a.m. to 11:33 p.m.)	0.5	0.045	2.0	1.8	0.2	0.001	0.000	0.002	0.003		0.000	0.000	194	121	11	1
Edson Area	Site # 8		(12:20 p.m. to 1:17 p.m.)	0.3	0.047	2.0	1.8	0.1	0.001	0.005	0.005	0.010		0.001	0.001	200	119	12	1
One-hour guideline				**13.0**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2.0**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

n/a No one hour guideline.
no data - Indicates that the analyzer was not operational for the indicated time period.
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CH_4 - methane
RHC - reactive hydrocarbons
SO_2 - sulphur dioxide
NO - nitric oxide
NO_2 - nitrogen dioxide
NO_X - total oxides of nitrogen
NH_3 - ammonia
TRS - total reduced sulphur
H_2S - hydrogen sulphide
TSP - total suspended particulates
PM_{10} - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

Table A8: One-hour average air quality parameter concentrations in the Edson/Hinton Areas (June 4 and 5, 2000).

Area	Site #	Date	Monitoring Time (MST)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NOx	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	$\mu g/m^3$			ng/m^3
Town of Edson	Site # 2	4-Jun-00	(8:58 a.m. to 9:57 a.m.)	*0.3*	0.037	2.0	1.9	0.1	0.021	0.006	0.007	0.013	0.003	0.001	0.001	43	26	3	0
	Site # 2		(9:58 a.m. to 10:57 a.m.)	0.2	0.042	1.9	1.9	0.0	0.001	0.005	0.006	0.011	0.001	0.000	0.000	26	16	2	0
	Site # 2		(10:58 a.m. to 11:57 a.m.)	0.1	0.042	2.0	2.0	0.0	0.001	0.008	0.005	0.012	0.002	0.001	0.000	42	22	2	2
	Site # 2		(11:58 a.m. to 12:57 p.m.)	0.2	0.048	2.1	2.0	0.1	0.001	0.003	0.004	0.006	0.001	0.001	0.000	30	18	2	0
	Site # 2		(12:58 p.m. to 1:57 p.m.)	0.1	0.049	2.1	2.0	0.1	0.002	0.005	0.003	0.007	0.001	0.000	0.000	23	14	2	1
	Site # 2		(8:31 p.m. to 9:30 p.m.)	no data		2.2	1.9	0.4	0.002	0.008	0.020	0.027	no data		0.000	389	239	23	20
	Site # 2		(9:31 p.m. to 10:30 p.m.)			2.5	2.0	0.5	0.002	0.012	**0.027**	0.040			0.000	402	253	25	21
	Site # 2		(10:31 p.m. to 11:30 p.m.)			2.3	2.0	0.3	0.001	0.006	0.011	0.017			0.000	216	138	16	15
	Site # 2		(11:31 p.m. to 12:30 a.m.)			2.3	2.1	0.2	0.001	0.005	0.007	0.011			0.000	101	72	10	2
Town of Edson	Site # 2	5-Jun-00	(12:31 a.m. to 1:30 a.m.)	no data		2.2	2.1	0.1	0.001	0.003	0.007	0.010	no data		0.000	108	70	8	1
	Site # 2		(1:31 a.m. to 2:30 a.m.)			2.3	2.1	0.2	0.001	0.003	0.011	0.015			0.000	57	37	5	0
	Site # 2		(2:31 a.m. to 3:30 a.m.)			2.6	2.3	0.2	0.002	0.005	0.015	0.020			0.000	54	39	6	1
	Site # 2		(3:31 a.m. to 4:30 a.m.)			2.5	2.3	0.3	0.002	0.005	0.018	0.024			0.000	99	70	9	4
	Site # 2		(4:31 a.m. to 5:30 a.m.)			2.6	2.2	0.4	0.002	0.016	0.019	0.036			0.000	216	146	16	13
	Site # 1		(8:00 a.m. to 9:00 a.m.)	0.2	0.027	2.2	1.9	0.2	0.002	0.022	0.010	0.026	0.010	0.000	0.000	183	107	11	1
	Site # 3		(9:20 a.m. to 10:19 a.m.)	0.1	0.048	2.0	1.8	0.2	0.001	0.004	0.004	0.007	0.003	0.000	0.000	105	70	8	1
	Site # 2		(11:03 a.m. to 12:02 p.m.)	0.2	**0.055**	2.0	1.7	0.2	0.002	0.003	0.005	0.008	0.003	0.000	0.000	127	86	10	1
	Site # 2		(12:03 p.m. to 1:02 p.m.)	0.2	**0.055**	2.0	1.7	0.3	0.000	0.004	0.007	0.011	0.005	0.000	0.000	135	89	10	1
One-hour guideline				**13.0**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2.0**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

n/a No one hour guideline.

no data - Indicates that the analyzer was not operational for the indicated time period.

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CH_4 - methane
RHC - reactive hydrocarbons
SO_2 - sulphur dioxide
NO - nitric oxide
NO_2 - nitrogen dioxide
NO_X - total oxides of nitrogen
NH_3 - ammonia
TRS - total reduced sulphur
H_2S - hydrogen sulphide
TSP - total suspended particulates
PM_{10} - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

Table A9: One-hour average air quality parameter concentrations in the Edson/Hinton Areas (June 13 and 14, 2000).

Area	Site #	Date	Monitoring Time (MST)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NOx	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	$\mu g/m^3$			ng/m^3
Edson Area	Site # 4	13-Jun-00	(9:51 a.m. to 10:51 a.m.)	0.5	0.018	2.2	1.8	0.4	0.001	0.010	0.008	0.017	0.011	0.000	0.001	289	146	9	2
	Site # 7		(11:37 a.m. to 12:38 p.m.)	0.3	0.024	1.9	1.8	0.1	0.002	0.005	0.001	0.000	0.007	0.000	0.000	16	5	1	1
	Site # 8		(1:26 p.m. to 2:25 p.m.)	0.0	0.024	1.8	1.8	0.0	0.001	0.002	0.001	0.002	0.005	0.000	0.000	25	15	2	0
Town of Edson	Site # 3		(3:07 p.m. to 4:06 p.m.)	0.1	0.025	1.9	1.8	0.0	0.001	0.012	0.003	0.010	0.005	0.000	0.000	10	7	1	1
Edson Area	Site # 9		(4:41 p.m. to 5:34 p.m.)	0.1	0.026	1.9	1.8	0.0	0.002	0.006	0.003	0.008	0.006	0.000	0.000	7	4	1	0
Town of Edson	Site # 2		(5:48 p.m. to 6:48 p.m.)	0.3	0.022	2.2	1.8	0.3	0.002	0.016	0.011	0.021	0.004	0.000	0.000	93	53	4	4
	Site # 2		(7:16 p.m. to 8:15 p.m.)	no data		2.0	1.8	0.1	0.000	0.006	0.007	0.012	no data		0.000	187	102	9	5
	Site # 2		(8:16 p.m. to 9:15 p.m.)			2.0	1.9	0.1	0.000	0.005	0.009	0.014			0.000	251	142	11	5
	Site # 2		(9:17 p.m. to 10:16 p.m.)			2.0	1.9	0.1	0.000	0.005	0.006	0.011			0.000	122	70	6	9
	Site # 2		(10:17 p.m. to 11:16 p.m.)			2.0	1.8	0.1	0.000	0.009	0.012	0.021			0.000	135	81	7	3
	Site # 2		(11:17 p.m. to 12:16 a.m.)			2.1	1.9	0.2	0.000	0.009	0.013	0.023			0.000	95	60	6	5
Town of Edson	Site # 2	14-Jun-00	(12:17 a.m. to 1:16 a.m.)	no data		2.1	1.9	0.1	0.001	0.020	0.017	0.037	no data		0.000	61	41	5	34
	Site # 2		(1:17 a.m. to 2:16 a.m.)			2.0	1.9	0.1	0.001	0.019	0.017	0.035			0.000	67	43	5	7
	Site # 2		(2:17 a.m. to 3:16 a.m.)			2.0	1.8	0.2	0.000	0.013	0.014	0.027			0.000	50	32	3	4
	Site # 2		(3:17 a.m. to 4:16 a.m.)			1.9	1.8	0.1	0.000	0.005	0.012	0.017			0.000	10	8	2	2
	Site # 2		(4:17 a.m. to 5:16 a.m.)			2.1	1.8	0.2	0.000	0.013	0.013	0.025			0.000	50	32	3	7
	Site # 2		(5:17 a.m. to 6:16 a.m.)			2.1	1.9	0.2	0.001	0.014	0.012	0.025			0.000	68	42	4	6
Edson Area	Site # 9		(7:59 a.m. to 9:00 a.m.)	0.1	0.017	2.1	2.0	0.1	0.001	0.009	0.007	0.014	0.008	0.000	0.000	9	6	1	1
	Site # 9		(9:24 a.m. to 10:24 a.m.)	0.2	0.023	2.2	2.0	0.2	0.006	0.009	0.005	0.013	0.003	0.001	0.001	8	5	1	5
	Site # 10		(11:31 a.m. to 12:31 p.m.)	0.1	0.027	1.9	1.8	0.0	0.000	0.000	0.001	0.000	0.000	0.000	0.000	4	3	0	0
	Site # 7		(2:06 p.m. to 3:08 p.m.)	0.0	0.031	1.9	1.8	0.0	0.006	0.001	0.001	0.002	0.002	0.000	0.000	10	4	1	0
	Site # 8		(3:53 p.m. to 4:54 p.m.)	0.1	0.033	1.9	1.8	0.1	0.003	0.001	0.001	0.001	0.002	0.000	0.000	10	5	1	0
Town of Edson	Site # 3		(5:44 p.m. to 6:42 p.m.)	0.1	0.038	1.9	1.8	0.1	0.001	0.001	0.001	0.002	0.002	0.000	0.000	11	6	1	0
Town of Hinton	Site # 15		(8:57 p.m. to 9:56 p.m.)	no data		1.7	1.6	0.1	0.000	0.001	0.005	0.005	no data		0.000	10	5	1	0
	Site # 15		(9:57 p.m. to 10:56 p.m.)			1.9	1.8	0.1	0.000	0.008	0.022	0.030			0.000	51	30	3	5
	Site # 15		(10:57 p.m. to 11:56 p.m.)			1.9	1.8	0.0	0.001	0.013	0.026	0.040			0.001	17	11	2	5
One-hour guideline				**13.0**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2.0**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

n/a No one hour guideline.
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NO - nitric oxide
NO_2 - nitrogen dioxide
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NH_3 - ammonia
TRS - total reduced sulphur
H_2S - hydrogen sulphide
TSP - total suspended particulates
PM_{10} - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

Table A10: One-hour average air quality parameter concentrations in the Edson/Hinton Areas (June 15 and 16, 2000).

Area	Site #	Date	Monitoring Time (MST)	CO	O_3	THC	CH_4	RHC	SO_2	NO	NO_2	NOx	NH_3	TRS	H_2S	TSP	PM_{10}	$PM_{2.5}$	PAH
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	$\mu g/m^3$			ng/m^3
Town of Hinton	Site # 15	15-Jun-00	(11:57 p.m. to 12:50 a.m.)	no data		1.8	1.8	0.0	0.001	0.005	0.011	0.016	no data		0.000	11	7	1	18
	Site # 17		(5:15 a.m. to 6:18 a.m.)	0.4	0.009	2.0	1.9	0.1	0.000	0.018	0.014	0.032	0.003	0.001	0.000	225	122	11	16
	Site # 13		(6:37 a.m. to 7:38 a.m.)	0.2	0.007	2.0	1.8	0.2	0.000	0.035	0.025	0.060	0.005	0.000	0.000	142	81	8	17
	Site # 12		(7:46 a.m. to 8:46 a.m.)	0.0	0.026	1.8	1.7	0.1	0.000	0.004	0.003	0.008	0.000	0.000	0.000	31	18	1	3
	Site # 14		(9:16 a.m. to 10:16 a.m.)	0.1	0.022	1.8	1.7	0.1	0.000	0.006	0.004	0.011	0.010	0.000	0.000	6	4	1	1
	Site # 17		(10:24 a.m. to 11:25 a.m.)	0.2	0.015	1.9	1.7	0.2	0.001	0.017	0.015	0.033	0.002	0.001	0.001	49	31	4	8
	Site # 13		(11:30 a.m. to 12:30 p.m.)	0.5	0.015	2.0	1.7	0.3	0.001	0.028	0.016	0.044	0.004	0.000	0.000	69	44	5	22
	Site # 12		(12:38 p.m. to 1:38 p.m.)	0.2	0.030	1.8	1.7	0.1	0.001	0.000	0.001	0.002	0.001	0.000	0.000	7	4	1	0
	Site # 17		(1:49 p.m. to 2:50 p.m.)	0.2	0.032	1.8	1.7	0.1	0.001	0.000	0.000	0.000	0.000	0.001	0.000	8	5	1	0
	Site # 13		(2:55 p.m. to 3:53 p.m.)	0.8	0.022	2.1	1.7	0.4	0.005	0.032	0.013	0.038	0.009	0.004	0.003	74	44	5	23
	Site # 15		(4:19 p.m. to 5:23 p.m.)	0.1	0.022	1.9	1.6	0.2	0.005	0.010	0.008	0.018	0.003	0.001	0.001	14	9	1	3
	Site # 15		(5:54 p.m. to 6:53 p.m.)	no data		1.8	1.7	0.1	0.004	0.007	0.006	0.013	no data		0.001	no data			3
	Site # 15		(6:54 p.m. to 7:53 p.m.)			1.7	1.7	0.1	0.002	0.003	0.005	0.008			0.001				1
	Site # 15		(7:54 p.m. to 8:53 p.m.)			1.8	1.7	0.1	0.001	0.007	0.008	0.015			0.002	11	7	1	2
	Site # 15		(8:54 p.m. to 9:53 p.m.)			1.7	1.7	0.0	0.000	0.003	0.007	0.009			0.001	10	6	1	1
	Site # 15		(9:54 p.m. to 10:53 p.m.)			1.7	1.7	0.0	0.000	0.015	0.013	0.027			0.002	15	10	1	12
	Site # 15		(10:54 p.m. to 11:53 p.m.)			1.7	1.7	0.0	0.001	0.007	0.007	0.014			0.002	8	5	1	3
Town of Hinton	Site # 15	16-Jun-00	(11:54 p.m. to 12:53 a.m.)	no data		1.7	1.7	0.0	0.001	0.003	0.008	0.010	no data		0.003	9	6	1	3
	Site # 15		(12:54 a.m. to 1:53 a.m.)			1.7	1.7	0.0	0.001	0.003	0.003	0.006			0.003	5	4	1	1
	Site # 15		(1:54 a.m. to 2:53 a.m.)			1.7	1.7	0.0	0.001	0.001	0.002	0.003			0.003	6	4	1	0
	Site # 15		(2:54 a.m. to 3:53 a.m.)			1.7	1.7	0.0	0.001	0.002	0.005	0.007			0.0	7	4	1	1
	Site # 17		(5:19 a.m. to 6:21 a.m.)	0.1	0.012	2.0	1.9	0.1	0.000	0.005	0.007	0.015	0.004	0.000	0.003	35	21	3	3
	Site # 13		(6:28 a.m. to 7:28 a.m.)	0.1	0.014	2.0	1.9	0.1	0.000	0.004	0.006	0.013	0.001	0.000	0.002	7	5	1	4
	Site # 16		(7:35 a.m. to 8:34 a.m.)	0.0	0.010	2.0	1.9	0.1	0.000	0.001	0.008	0.012	0.001	0.000	0.003	7	5	1	2
	Site # 15		(9:00 a.m. to 10:00 a.m.)	0.1	0.016	2.0	1.8	0.1	0.000	0.001	0.002	0.004	0.000	0.000	0.001	7	5	1	3
	Site # 12		(10:19 a.m. to 11:18 a.m.)	0.1	0.019	2.0	1.8	0.1	0.001	0.002	0.006	0.009	0.000	0.000	0.002	6	5	1	2
	Site # 13		(11:40 a.m. to 12:39 p.m.)	0.2	0.020	1.9	1.8	0.1	0.001	0.005	0.008	0.013	0.003	0.000	0.001	6	5	1	3
	Site # 14		(12:58 p.m. to 2:00 p.m.)	0.0	0.022	1.8	1.8	0.0	0.002	0.003	0.002	0.005	0.002	0.000	0.000	6	4	1	0
	Site # 17		(2:21 p.m. to 3:24 p.m.)	0.2	0.022	1.9	1.8	0.1	0.002	0.013	0.009	0.021	0.003	0.000	0.000	68	44	5	10
One-hour guideline				**13.0**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2.0**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

n/a No one hour guideline.
no data - Indicates that the analyzer was not operational for the indicated time period.
Data in *italics* indicates less than 75% data available for the hour.
ng/m^3 - nanograms per cubic metre of air
$\mu g/m^3$ - micrograms per cubic metre of air
ppm - parts per million
Data in **bold** indicates the maximum concentration measured during the survey.

List of Air Quality Parameters

CO - carbon monoxide
O_3 - ozone
THC - total hydrocarbons
CH_4 - methane
RHC - reactive hydrocarbons
SO_2 - sulphur dioxide
NO - nitric oxide
NO_2 - nitrogen dioxide
NO_X - total oxides of nitrogen
NH_3 - ammonia
TRS - total reduced sulphur
H_2S - hydrogen sulphide
TSP - total suspended particulates
PM_{10} - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

Table A11: Weather Conditions and Operator's Observations in the Edson/Hinton Areas (September 13, 14, 15 and 16, 1999).

Area	Site #	Date	Monitoring Time MST	Temp. °C	RH %	WSP km/h	WDR	Cloud % Cld Cover	Operator's Observations
Edson Area	Site # 5	13-Sep-99	(11:39 a.m. to 12:39 p.m.)	24	31	3	SW	0%	CCS access rd 1 km NE of CCS. 11:49 a.m.-Just outside facility gates.
	Site # 9		(2:38 p.m. to 3:35 p.m.)	26	29	4	S	0%	Rge Rd 181A, 1km NE of stack.
	Site # 9		(3:43 p.m. to 4:40 p.m.)	22	36	4	SE	0%	Rge Rd 181A, 1km NE of stack.
Edson Area	Site # 11	14-Sep-99	(7:48 a.m. to 8:48 a.m.)	8	80	10	SW	0%	NE of Weyerhauser mill. Alongside mill on Rge Rd 171.
	Site # 6		(9:20 a.m. to 10:20 a.m.)	17	54	7	SW	0%	Gibsons truck loading facility, adjacent to Hwy 16.
	Site # 5		(11:24 a.m. to 12:19 p.m.)	24	36	3	SE	0%	Outside CCS Edson facility gate.
	Site # 9		(1:49 p.m. to 2:55 p.m.)	26	24	6	W	0%	Rge Rd 181A 1km NE of Talisman plant
Town of Edson	Site # 1		(3:44 p.m. to 5:15 p.m.)	27	17	4	SW	0%	Edson Airport.
	Site # 3		(5:26 p.m. to 6:29 p.m.)	21	30	5	W	0%	Golf course, High School, Vision Park Ball diamonds. (31 St. & 8 Ave.)
Edson Area	Site # 9		(6:51 p.m. to 7:52 p.m.)	14	67	1	S	0%	Pass slowly just E of Talisman Plant. (7:07 p.m.-stop directly S of plant.)
Town of Hinton	Site # 12	15-Sep-99	(8:42 a.m. to 9:43 a.m.)	12	58	5	SW	0%	MacKay Crescent - Valley District.
	Site # 13		(10:07 a.m. to 11:07 a.m.)	16	44	7	W	0%	Duncan Murray Rec. Centre. Steady traffic on Switzer Dr.
	Site # 14		(11:57 a.m. to 12:56 p.m.)	24	27	4	S	0%	LDS Church on Mountain Street near Reimer Dr. - Hill District.
	Site # 15		(1:04 p.m. to 2:02 p.m.)	25	18	8	SW	0%	Tocher Ave. & Brown St. - Hill District.
	Site # 16		(2:17 p.m. to 3:18 p.m.)	26	16	6	S	0%	Mary Reimer Park.
	Site # 13		(4:13 p.m. to 5:12 p.m.)	25	20	4	SE	0%	Duncan Murray Rec. Centre (across Switzer Dr. from Weldwood Mill).
	Site # 14		(5:39 p.m. to 6:39 p.m.)	21	48	2	S	0%	LDS Church on Mountain St. near Reimer Dr. - Hill District
Town of Hinton	Site # 17	16-Sep-99	(7:49 a.m. to 9:15 a.m.)	11	76	2	SE	70%	Along Switzer Dr., CO & NO from traffic on Switzer Dr
	Site # 13		(9:17 a.m. to 10:33 a.m.)	16	53	5	SW	50%	Duncan Murray Rec. Centre.
	Site # 14		(10:45 a.m. to 11:49 a.m.)	21	37	3	SW	n/a	LDS church (11:31a.m. - Lawn mower next to MAML causing readings. 11:38 a.m. - reposition in parking lot to get away from lawn mower). - Note high PAH as well as CO, not typical of MAML exhaust readings.
	Site # 15		(12:15 p.m. to 1:16 p.m.)	25	27	3	S	10%	Tocher Ave. & Brown St. - Hill District.
	Site # 16		(1:25 p.m. to 2:26 p.m.)	25	29	4	S	n/a	Mary Reimer Park. (1:58 p.m. - odours from Pulp mill.)
	Site # 17		(2:31 p.m. to 3:33 p.m.)	26	25	9	SW	n/a	Switzer Dr. near Joblin St. (2:35 p.m.-faint pulp mill odour.)
	Site # 13		(3:50 p.m. to 4:51 p.m.)	25	23	15	SW	n/a	Behind Weldwood mill - near wood chip dump.
	Site # 13		(5:03 p.m. to 6:05 p.m.)	23	27	10	SE	20%	Duncan Murray Rec. Centre.

Table A12: Weather Conditions and Operator's Observations in the Edson/Hinton Areas (February 7, 8, 9, 17 and 18, 2000).

Area	Site #	Date	Monitoring Time MST	Temp. °C	RH %	WSP km/h	WDR	Cloud % Cld Cover	Operator's Observations
Town of Hinton	Site # 14	7-Feb-00	(1:28 p.m. to 2:37 p.m.)	11	35	12	SW	overcast	LDS Church on Mountain St. near Reimer Dr. - Hill District.
	Site # 15		(2:43 p.m. to 3:51 p.m.)	9	41	12	SW	overcast	Tocher Ave. & Brown St.
	Site # 13		(4:01 p.m. to 5:05 p.m.)	9	38	19	S	overcast	Duncan Murray Rec. Centre.
	Site # 16		(5:17 p.m. to 6:18 p.m.)	10	34	13	S	overcast	Mary Reimer Park. (5:18 p.m. - H_2S odour evident from mill.)
	Site # 17		(6:25 p.m. to 7:27 p.m.)	10	34	28	SW	overcast	Switzer Dr. near Joblin St. (6:27 p.m. - Mill odour still evident.)
	Site # 16		(7:32 p.m. to 8:34 p.m.)	10	37	16	S	overcast	Mary Reimer Park. (7:34 p.m. - No odours.)
	Site # 15		(8:44 p.m. to 9:43 p.m.)	9	40	19	SW	overcast	Dow Dr. & Smith St.
Town of Hinton	Site # 15	8-Feb-00	(8:15 a.m. to 9:20 a.m.)	6	48	8	SW	overcast	Tocher Ave. & Brown St. - Hill District.
	Site # 16		(9:40 a.m. to 10:54 a.m.)	6	49	5	S	overcast	Mary Reimer Park. (9:41a.m. - Mill odours evident, not overpowering).
	Site # 17		(11:00 a.m. to 11:58 a.m.)	8	42	9	SW	overcast	Switzer Dr. near Joblin St. (11:01a.m. - Typical mill odours.)
	Site # 13		(12:08 p.m. to 1:10 p.m.)	10	32	11	W	overcast	Duncan Murray Rec. Centre. (12:09 p.m. - No odours present but not downwind of mill either.
	Site # 14		(2:30 p.m. to 3:56 p.m.)	6	48	7	SW	overcast	LDS Church on Mountain Street near Reimer Dr. - Hill District.
	Site # 13		(4:03 p.m. to 5:04 p.m.)	2	81	16	E	overcast	Duncan Murray Rec. Centre. (4:04 p.m. - snowing lightly.)
	Site # 18		(5:20 p.m. to 6:19 p.m.)	-1	92	13	W	overcast	E end of Charmicheal Ave. on Hwy 16. (5:21p.m. - snowing, 5:23 p.m. - some mill odour evident).
	Site # 15		(6:36 p.m. to 7:39 p.m.)	-3	92	14	SE	overcast	Tocher Ave. & Brown St. - Hill District. (snowing.)
Town of Edson	Site # 2	9-Feb-00	(9:43 a.m. to 10:47 a.m.)	-14	88	7	SW	overcast	Provincial bldg. (9:59 a.m. - smells like OSB board.
	Site # 1		(11:14 a.m. to 12:18 p.m.)	-12	82	10	E	overcast	Edson Airport. (11:14 a.m. - slight odour evident from Weyerhauser mill.)
	Site # 2		(12:29 p.m. to 1:37 p.m.)	-12	78	11	NE	overcast	Provincial bldg.
Edson Area	Site # 9		(2:05 p.m. to 3:12 p.m.)	-11	79	8	E	overcast	2 km S of Bickerdike Rd corner on Hwy 47. (2:05 p.m. - odours & readings from Talisman plant.)
Edson Area	Site # 9	17-Feb-00	(2:28 p.m. to 3:25 p.m.)	3	36	7	SW	0%	Rge Rd 181 near rail crossing. (downwind of Talisman Plant.)
	Site # 11		(3:53 p.m. to 4:58 p.m.)	2	36	8	W	0%	Industrial park 1km E. Downwind of the Weyerhauser mill. (some odour from the Weyerhauser mill.)
	Site # 7		(5:52 p.m. to 6:55 p.m.)	-4	60	1	SW	0%	Plant access road, at T intersection near Nova Rosevear meter station. Source of H_2S likely Nova meter station or well site just E of it. (5:55 p.m. - Stinky with H_2S!! 5:56 p.m. - Truck loading/unloading at terminal, also at plant but wind is not likely from there.)
Town of Edson	Site # 1		(7:37 p.m. to 8:37 p.m.)	-10	82	5	W	0%	Edson Airport.
Edson Area	Site # 9	18-Feb-00	(9:15 a.m. to 10:30 a.m.)	-4	51	10	E	n/a	Talismen Edson.
	Site # 7		(11:24 a.m. to 12:24 p.m.)	1	40	5	SW	n/a	Turn W onto Twp Rd 550 past Suncor N Rosevear plant. (within 1/2 km of plant.)
	Site # 8		(2:04 p.m. to 3:07 p.m.)	7	31	9	W	10%	Rge Rd 150A 1 mile SE of Suncor S Rosevear plant.

Table A13: Weather Conditions and Operator's Observations in the Edson/Hinton Areas (April 18, 19, 25, 26 and 27, 2000).

Area	Site #	Date	Monitoring Time MST	Temp. °C	RH %	WSP km/h	WDR	Cloud % Cld Cover	Operator's Observations
Town of Hinton	Site # 14	18-Apr-00	(11:53 a.m. to 12:48 p.m.)	14	19	10	SW	0%	LDS Church on Mountain Street near Reimer Dr. - Hill District.
	Site # 16		(1:01 p.m. to 1:57 p.m.)	16	15	11	S	0%	Mary Reimer Park & Rodeo grounds - Valley Dist.
	Site # 17		(2:04 p.m. to 2:59 p.m.)	16	16	12	SW	10%	Switzer Dr. near Joblin St. - Valley Dist.
	Site # 13		(3:07 p.m. to 3:59 p.m.)	16	18	12	SW	0%	Schoolyard, same as Site #13 (3:25 p.m. - Duncan Murray Rec. Centre, still Site #13.)
	Site # 16		(4:06 p.m. to 4:58 p.m.)	16	17	13	SW	0%	Mary Reimer Park & Rodeo grounds - Valley Dist.
	Site # 15		(5:58 p.m. to 7:04 p.m.)	14	19	14	S	60%	Tocher Ave. & Brown St. - Hill District.
Town of Hinton	Site # 15	19-Apr-00	(7:07 a.m. to 8:16 a.m.)	2	73	5	V	80%	Brown St. & Tocher Ave.
	Site # 13		(8:26 a.m. to 9:29 a.m.)	4	66	4	NE-SW	90%	Duncan Murray Rec. Centre - Valley District.
	Site # 16		(9:37 a.m. to 10:36 a.m.)	5	60	3	SE	100%	Mary Riemer Park.
	Site # 14		(10:51 a.m. to 11:58 a.m.)	9	46	4	N	90%	LDS church on Mountain St.
	Site # 18		(12:10 p.m. to 1:10 p.m.)	11	38	6	NE	60%	Jasper St. & Pembina Ave. (12:12 p.m. - H_2S odour likely from ponds @ the mill. Downwind of mill.)
	Site # 18		(1:21 p.m. to 2:20 p.m.)	18	23	6	NE-SW	n/a	Kelly Rd. & W River Rd. (1:21 p.m.-H_2S odour likely from ponds @ the mill. Downwind of mill.)
	Site # 16		(2:32 p.m. to 3:31p.m.)	16	26	19	S	n/a	Mary Riemer Park.
	Site # 13		(3:39 p.m. to 4:39 p.m.)	15	27	19	SW	n/a	Duncan Murray Rec. Centre - Valley District
Edson Area	Site # 7	25-Apr-00	(2:40 p.m. to 3:38 p.m.)	14	24	8	SE	80%	Hwy 32 & Twp Rd 562.
Town of Edson	Site # 3		(4:04 p.m. to 5:06 p.m.)	13	23	14	E	n/a	Vision Park 31 St. & 8 Ave.
	Site # 1		(5:40 p.m. to 6:44 p.m.)	13	25	12	E	n/a	Edson airport.
Edson Area	Site # 9	26-Apr-00	(7:44 a.m. to 8:49 a.m.)	8	41	7	SW	60%	Rge Rd 181A, downwind of Talisman plant, 100m N of tracks approx 1km from plant. (7:46 a.m. - typical plant odour evident.)
	Site # 10		(9:04 a.m. to 10:02 a.m.)	10	34	11	S	40%	1km downwind SE of TransMountain tank farm. (9:05 a.m. - no odours.)
	Site # 11		(11:15 a.m. to 12:24 p.m.)	13	25	10	SW	60%	Industrial area 1km downwind of Weyerhauser.
	Site # 8		(1:17 p.m. to 2:40 p.m.)	14	22	8	S	80%	Suncor South Rosevear plant
	Site # 7		(3:46 p.m. to 4:43 p.m.)	17	20	6	S	40%	Twp Rd 550 on N perimeter of Suncor North Rosevear plant.
Town of Edson	Site # 3		(5:03 p.m. to 6:06 p.m.)	16	22	6	S	20%	Vision Park 31 St & 8 Ave, not downwind of Weyerhauser. (5:45 p.m. - odours from Weyerhauser plant now evident.)
	Site # 1		(6:19 p.m. to 7:32 p.m.)	14	23	7	E	10%	Edson Airport.
Edson Area	Site # 9	27-Apr-00	(7:39 a.m. to 8:42 a.m.)	10	36	11	SE	0%	Service rd. along Hwy 47. Some odour from Talisman Gas Plant.
Town of Edson	Site # 3		(9:15 a.m. to 10:15 a.m.)	13	32	17	E	100%	Vision Park ball diamonds. (odours evident from Weyerhauser mill).
	Site # 1		(10:35 a.m. to 11:33 p.m.)	15	28	18	SE	100%	Edson Airport.
Edson Area	Site # 8		(12:20 p.m. to 1:17 p.m.)	17	24	9	SE	100%	Twp Rd 542 outside Suncor S Rosevear Gas Plant.

Table A14: Weather Conditions and Operator's Observations in the Edson/Hinton Areas (June 4 and 5, 2000).

Area	Site #	Date	Monitoring Time MST	Temp. °C	RH %	WSP km/h	WDR	Cloud % Cld Cover	Operator's Observations
Town of Edson	Site # 2	4-Jun-00	(8:58 a.m. to 9:57 a.m.)	24	22	6	SW	0%	Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(9:58 a.m. to 10:57 a.m.)	26	17	5	S	0%	Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(10:58 a.m. to 11:57 a.m.)	25	15	6	SE	0%	Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(11:58 a.m. to 12:57 p.m.)	26	14	7	S	0%	Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(12:58 p.m. to 1:57 p.m.)	27	13	7	S	0%	Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(8:31 p.m. to 9:30 p.m.)	21	28	4	SE	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(9:31 p.m. to 10:30 p.m.)	17	42	2	SW	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(10:31 p.m. to 11:30 p.m.)	14	52	3	SW	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(11:31 p.m. to 12:30 a.m.)	12	60	4	SW	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
Town of Edson	Site # 2	5-Jun-00	(12:31 a.m. to 1:30 a.m.)	12	57	4	S	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(1:31 a.m. to 2:30 a.m.)	13	55	4	SE	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(2:31 a.m. to 3:30 a.m.)	11	64	4	S	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(3:31 a.m. to 4:30 a.m.)	11	67	2	SW	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(4:31 a.m. to 5:30 a.m.)	10	69	4	SW	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 1		(8:00 a.m. to 9:00 a.m.)	21	37	5	S	0%	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 3		(9:20 a.m. to 10:19 a.m.)	20	37	10	E	0%	Edson airport.
	Site # 2		(11:03 a.m. to 12:02 p.m.)	25	27	13	E	0%	Vision Park 31 St. & 8 Ave.
	Site # 2		(12:03 p.m. to 1:02 p.m.)	26	27	13	E	0%	Provincial bldg. 52 St. & 2 Ave.

Table A15: Weather Conditions and Operator's Observations in the Edson/Hinton Areas (June 13 and 14, 2000).

Area	Site #	Date	Monitoring Time MST	Temp. °C	RH %	WSP km/h	WDR	Cloud % Cld Cover	Operator's Observations
Edson Area	Site # 4	13-Jun-00	(9:51 a.m. to 10:51 a.m.)	17	54	8	W	80%	Anadime facility on Hwy 16. (9:53 a.m. - odour evident from facility. Trucks entering & departing facility.)
	Site # 7		(11:37 a.m. to 12:38 p.m.)	19	40	9	SW	80%	Suncor North Rosever plant. (Twp Rd 550 & Hwy 748.)
	Site # 8		(1:26 p.m. to 2:25 p.m.)	14	64	13	SW	overcast	1km SE Suncor S Rosevear plant on Rge Rd 150A.(thunderstorm threatening)
Town of Edson	Site # 3		(3:07 p.m. to 4:06 p.m.)	18	49	6	SE	100%	Vision Park 31 St. & 8 Ave.
Edson Area	Site # 9		(4:41 p.m. to 5:34 p.m.)	18	49	6	S	80%	Hwy 16 between Hwy 47 & Rge Rd 181A.
Town of Edson	Site # 2		(5:48 p.m. to 6:48 p.m.)	18	51	8	SE	n/a	Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(7:16 p.m. to 8:15 p.m.)	17	54	4	S	n/a	Stationary monitoring while parked near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(8:16 p.m. to 9:15 p.m.)	15	67	3	SE	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(9:17 p.m. to 10:16 p.m.)	14	69	4	SW	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(10:17 p.m. to 11:16 p.m.)	13	69	3	W	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(11:17 p.m. to 12:16 a.m.)	11	80	2	SW	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
Town of Edson	Site # 2	14-Jun-00	(12:17 a.m. to 1:16 a.m.)	11	81	3	S	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(1:17 a.m. to 2:16 a.m.)	11	81	2	SW	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(2:17 a.m. to 3:16 a.m.)	11	84	3	W	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(3:17 a.m. to 4:16 a.m.)	10	87	3	S	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(4:17 a.m. to 5:16 a.m.)	10	88	2	W	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
	Site # 2		(5:17 a.m. to 6:16 a.m.)	11	84	4	S	n/a	Overnight sampling near Provincial bldg. 52 St. & 2 Ave.
Edson Area	Site # 9		(7:59 a.m. to 9:00 a.m.)	13	71	3	S	overcast	Wellsite SE of plant on Rge Rd 181A. (very light winds.)
	Site # 9		(9:24 a.m. to 10:24 a.m.)	14	65	6	W	n/a	Rge Rd 181A & railroad Twp Rd.
	Site # 10		(11:31 a.m. to 12:31 p.m.)	14	69	10	SW	overcast	Wellsite rd. just off Rge Rd 185, approx. 1km from tank farm. (raining.)
	Site # 7		(2:06 p.m. to 3:08 p.m.)	19	40	8	SW	100%	On approach to plantsite on Hwy 748.
	Site # 8		(3:53 p.m. to 4:54 p.m.)	17	43	16	W	100%	Wellsite rd. 1km downwind of Suncor plant, Rge Rd 150A.
Town of Edson	Site # 3		(5:44 p.m. to 6:42 p.m.)	17	36	14	NW	80%	Vision Park 31 St. & 8 Ave.
Town of Hinton	Site # 15		(8:57 p.m. to 9:56 p.m.)	13	42	6	SW	n/a	Overnight sampling near Tocher Ave. & Brown St. - Hill District.
	Site # 15		(9:57 p.m. to 10:56 p.m.)	11	50	5	SW	n/a	Overnight sampling near Tocher Ave. & Brown St. - Hill District.
	Site # 15		(10:57 p.m. to 11:56 p.m.)	8	69	4	SW	n/a	Overnight sampling near Tocher Ave. & Brown St. - Hill District.

Table A16: Weather Conditions and Operator's Observations in the Edson/Hinton Areas (June 15 and 16, 2000).

Area	Site #	Date	Monitoring Time MST	Temp. °C	RH %	WSP km/h	WDR	Cloud % Cld Cover	Operator's Observations
Town of Hinton	Site # 15	15-Jun-00	(11:57 p.m. to 12:50 a.m.)	7	73	4	SW	n/a	Overnight sampling near Tocher Ave. & Brown St. - Hill District.
	Site # 17		(5:15 a.m. to 6:18 a.m.)	8	76	2	SW	90%	Switzer Dr. near Joblin St. - Valley Dist.
	Site # 13		(6:37 a.m. to 7:38 a.m.)	10	62	5	SW	overcast	(spitting rain.) (6:38 a.m. - CO from Switzer Dr. traffic.)
	Site # 12		(7:46 a.m. to 8:46 a.m.)	9	69	10	W	overcast	MacKay Crescent - Valley District. (raining, heavy at times.)
	Site # 14		(9:16 a.m. to 10:16 a.m.)	8	85	3	S	overcast	LDS Church on Mountain Street near Reimer Dr. - Hill District. (raining.)
	Site # 17		(10:24 a.m. to 11:25 a.m.)	10	76	12	S	overcast	Switzer Dr. near Joblin St. (10:24 a.m. - some mill odour evident.)
	Site # 13		(11:30 a.m. to 12:30 p.m.)	11	71	10	SW	overcast	Duncan Murray Rec. Centre. (12:09 p.m. - readings from traffic on Switzer Dr.)
	Site # 12		(12:38 p.m. to 1:38 p.m.)	13	56	12	W	100%	MacKay Crescent - Valley District.
	Site # 17		(1:49 p.m. to 2:50 p.m.)	14	50	17	NW	n/a	Switzer Dr. near Joblin St. - Valley District.
	Site # 13		(2:55 p.m. to 3:53 p.m.)	13	57	11	SW	overcast	Duncan Murray Rec. Centre. (2:57 p.m. - mill odour very evident. 2:58 p.m. - CO/NO from traffic on Switzer Dr. 3:45 p.m. - readings from traffic on Switzer Dr.)(raining lightly.)
	Site # 15		(4:19 p.m. to 5:23 p.m.)	13	60	11	W	90%	Tocher Ave. & Brown St. (4:23 p.m. - SO_2 from the mill.)
	Site # 15		(5:54 p.m. to 6:53 p.m.)	12	66	7	V	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(6:54 p.m. to 7:53 p.m.)	12	62	5	SW	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(7:54 p.m. to 8:53 p.m.)	12	63	6	SW	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(8:54 p.m. to 9:53 p.m.)	11	66	4	SW	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(9:54 p.m. to 10:53 p.m.)	9	76	4	S	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(10:54 p.m. to 11:53 p.m.)	10	66	7	SW	n/a	Tocher Ave. & Brown St. - Hill District.
Town of Hinton	Site # 15	16-Jun-00	(11:54 p.m. to 12:53 a.m.)	9	65	5	S	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(12:54 a.m. to 1:53 a.m.)	10	62	7	S	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(1:54 a.m. to 2:53 a.m.)	10	62	8	SW	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 15		(2:54 a.m. to 3:53 a.m.)	10	61	7	S	n/a	Tocher Ave. & Brown St. - Hill District.
	Site # 17		(5:19 a.m. to 6:21 a.m.)	10	66	5	V	100%	Switzer Dr. near Joblin St. - Valley Dist. (light rain.)
	Site # 13		(6:28 a.m. to 7:28 a.m.)	9	73	6	SE	100%	Duncan Murray Rec. Centre.
	Site # 16		(7:35 a.m. to 8:34 a.m.)	9	82	6	S	100%	Mary Reimer Park. (light rain.)
	Site # 15		(9:00 a.m. to 10:00 a.m.)	9	82	5	SE	100%	Tocher Ave. & Brown St. - Hill District. (Raining.)
	Site # 12		(10:19 a.m. to 11:18 a.m.)	10	83	5	SE	overcast	MacKay Crescent - Valley District
	Site # 13		(11:40 a.m. to 12:39 p.m.)	10	82	6	SE	overcast	Duncan Murray Rec. Centre - Valley District. (light rain.)
	Site # 14		(12:58 p.m. to 2:00 p.m.)	12	76	3	SE	overcast	LDS Church on Mountain Street near Reimer Dr. - Hill District.
	Site # 17		(2:21 p.m. to 3:24 p.m.)	12	75	7	E	overcast	Switzer Dr. near Joblin St. - Valley Dist.